NOV 18 1921 UNIV. OF CHEMICAL LIBRARY NOV 1 0 1920 CHEMICAL LIBRARY

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLII. No. 2999.] LONDON, NOVEMBER 3, 1920. [72nd Year. Price 8d.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C. 2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, Ld.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 20.

PURIFYING MATERIAL
"Brownox-de-Luxe."
Unqualified Satisfaction given where used.
SPENT OXIDE PURCHASED
J. BROWN & CO., Ltd.
Saville Town, DEWSBURY.

TORBAY
JOINT STOPPING
FREE FROM LEAD.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C. 3.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

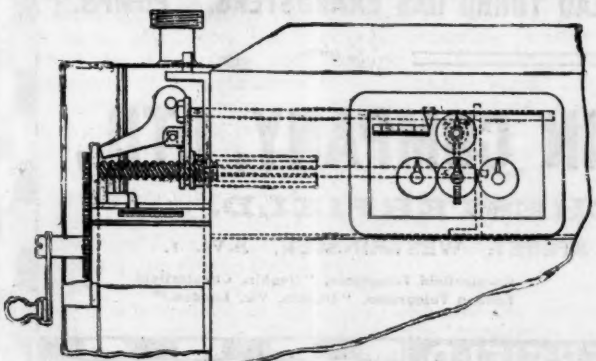
Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD., STOCKTON-ON-TEES.
Complete GAS WORKS
London Office:
80, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

GEORGE GLOVER & CO., LTD.,
CHELSEA.



"THE STANDARD"
SLOT METER.
THE ACME OF SIMPLICITY.
Can be fitted with **STRONG BOX,** if desired, or with **"M & M" LOCK.**

LONDON:
RANELAGH WORKS,
ROYAL AVENUE, CHELSEA, S.W. 3.
TELEPHONE: 1140 Kensington.
WIRE: "Dry Meters, London."

LEEDS:
9, DEWSBURY ROAD.
TELEPHONE: No. 26463.
WIRE: "Meters, Leeds."

MANCHESTER:
GAYTHORN METER WORKS,
EASTON STREET.
TELEPHONE: No. 6898 City.
WIRE: "Slot, Manchester."

PERKUDUR "ELASTIC PAINT
FOR ALL GAS PLANT AND STEEL STRUCTURES.
Does not blister or "chalk" off.
GRIFFITHS BROS. & CO. (LONDON), LTD.
BERMONDSEY, LONDON, S.E. 16.

W 669.

Length overall, 18 in.
Diameter of Reflector, 15 in.

Catalogues and Prices on application.

A LAMP OF DISTINCTIVE VALUE FOR Outdoor GAS LIGHTING

Fitted with 3 Medium Inverted Burners, each arranged with **PRE-HEATED CHAMBER.**

Outside Gas & Air Regulators.

Highly-finished Casing enamelled in dark green.

A Special Feature of this Lamp is that **NO INNER GLASSES** are required.

WELSBACH
OUTDOOR
PRE-HEATED LAMP

BRITISH-MADE

ADVT. OF THE WELSBACH LIGHT CO., LTD., WELSBACH HOUSE, KING'S CROSS, LONDON, W.C. 1

B DONKIN D

DONKIN
for
GAS VALVES
SINGLE AND DOUBLE FACED.

EXHAUSTERS, COMPRESSORS, RATEAU TURBO GAS EXHAUSTERS, PUMPS.

THE BRYAN DONKIN COMPANY, LTD.,

Head Offices & Works, **CHESTERFIELD.**

LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin, Vic. London."

B CHESTERFIELD D

GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLII., No. 2999.] WEDNESDAY, NOVEMBER 3, 1920. [72ND YEAR.

EDITORIAL NOTES.

The Coal Settlement.

IT is earnestly hoped that the next few hours will justify the heading to this article; and that afterwards day by day the pits will progressively restart working, and the output and distribution of coal will commence to bring about normal working conditions throughout the home industries, and then enable the export of coal to be resumed. If the miners are really animated, as they profess to be, by consideration for others as well as for themselves, that is what will happen. The agreement which was the subject of the ballot of the miners yesterday, and the result of which will be known to-day, was the outcome of the conferences between the Government and representative men of the Miners' Federation which began last Sunday week. The length of time occupied in the conferences, and the many comings and goings, declared the fact that both sides were profoundly anxious to endeavour to find a solution to the difficult problem. Both sides started from a sound basis—that it was necessary there should be increased production of coal in the interests of the country. This, without any other consideration, was a vindication of the attitude of the Government throughout this distressing piece. The miners, however, having rejected the production datum-line, search had to be made for means to secure the result on another basis. And for a temporary scheme values have been chosen. When the settlement was reached (subject to the ratification by the miners), from certain labour quarters came the cry of "Victory" for the miners. It is nothing of the kind. It is a temporary businesslike compromise, which gives time and provides for a permanent scheme being submitted to the Government by the owners and men not later than March 31 next. It also provides for a National Wages Board; and this "impartial tribunal" will obviate future bargainings between the owners and miners. Until these developments come to pass, all the rest is purely of transient character; and moreover both the miners' wages and the owners' profits, from Jan. 3 until the permanent scheme has been established, will be subject to a sliding-scale of values founded on production. This should ensure both owners and miners doing their united utmost to raise the output. This means co-operation; and, if the reports are not misleading, the strike has had a chastening effect, and the spirit of co-operation is to-day abroad in the mining industry. At the same time, the intelligence is that there are district miners' leaders who are opposed to the settlement, and are working to wreck it, as they would do any agreement that did not give them unconditionally their demands in full. On the other hand, news from the coalfields (excepting perhaps South Wales, Lancashire, and Cheshire) speak hopefully of the reception of the settlement by the miners. We do not for a moment expect unanimous acceptance. The elements making up the mining industry do not possess concordant minds; and so thoughts, views, and aims are not such that they will readily synthetize throughout the federated areas. But there is hope that a good majority of the men will give a vote favourable to the settlement; and it would be a very sensible thing if they would follow it up by giving the boot to the extremists among their leaders.

To keep complete in the "JOURNAL" the record of the trouble which resulted in the strike, and now the settlement, a brief outline of the terms of the latter must be given. The men are to get their rise of 2s. per shift for workers over 18 years of age; 1s. a shift for those between 16 and 18 years; and 9d. per shift for those below 16 years—the increases to be paid from the date work is resumed. This payment has been guaranteed by the Government till Dec. 31. During January, the wage is to be the same as the December wage, if values from export sales exceed the values of the average exports for the September quarter by a sum sufficient to cover the full wage advance. The five weeks ending Dec. 18 constitute the period to be taken to ascertain the increased values for regulating the January wages. Should the values be less than the amount required, then for every £288,000 less than the full amount needed, a reduction of 6d., 3d., and 2¼d. for adults, youths, and boys respectively will take place on Jan. 3, 1921. How, roughly, this will work out is that, when the output rate is not less than 238 million tons, the men will get 1s. per day increase, and an additional 6d. per day for every 4 millions beyond. Thus when the output is 242 million tons (increased value per week £288,000), the increase of wages will be 1s. 6d.; when 246 million tons (increased value £576,000), 2s.; 250 million tons (increased value £864,000), 2s. 6d.; and so on till at 262 to 266 million tons (the increased value being £1,728,000) it would be 4s. For every 6d. reduction in wages, the owners will lose a quarter of their profits above the guaranteed profits; and for every advance of 6d. per shift in wages, the owners' profits in excess of their guaranteed standard will be increased by one-quarter. Thus both sides stand to win or lose under the bargain; and therefore their interests are mutual. The Government guarantee export prices at 72s. per ton, whether they rise or fall below this figure. As already said, the scheme is only a temporary one until the National Wages Board is established, and a permanent scheme is drawn up, accepted, and comes into operation.

We all hope this signalizes the beginning of a period of durable peace in the coal industry, the continuance of work in which is fundamental to the prosperity of the whole country, as has been so strikingly emphasized during the past two-and-a-half weeks during which the pits have been idle. There are lessons in the strike for the extremists. One is that the Government and the nation are not in the mood for being trifled with; and that dictation by a section of the country will not be tolerated. When the Miners' Federation and other trade unions whose members have suffered from the action of the miners come to balance-up accounts, they will find that the tactics which have been given a trial are expensive to the unions as well as to the country. The fact that the agreement has been come to shows clearly that all avenues had not been explored, and all possibilities exhausted, before the Miners' Federation called out the men.

The First Applications for Orders.

CONSIDERATION of the applications for Orders under the Gas Regulation Act is going to be a formidable task. There are something like 850 statutory gas undertakings in the United Kingdom; and in addition, when the Rules and Regulations applying to Special Orders are issued, non-statutory undertakings will be able to make application for such Orders, which may also embrace powers covering the heat-unit basis of charging, with a declared calorific standard. Every undertaking has to have separate treatment at the hands of the Board. Thus it can be readily seen that the association of the Board of Trade and the gas industry will be at full tide for a considerable period ahead. Then in time the association will get into what will be a normal state; but, under the Act, or until (if ever) a change is made, it will be permanent. It is, however, the immediate work that is the important matter; and entrance upon it has now been definitely made. From start to finish—until the whole of the gas industry has been converted from the sale of cubic

feet to B.Th.U.—it will be the duty of every gas undertaking to help in the work by preparing all cases in clear and clean manner, and to be able to afford promptly any explanations that may be required. Preparedness of applicants will—it must do—ease the labours of the Board considerably; and it may also do much to avert opposition, or satisfy it, on points. On principles there can be no hostility; on terms there may be. And the most helpful things the Board can have are invulnerable and readily appreciated facts. On the terms of the schedule, if there is opposition, there may have to be inquiry into the details. Should this be the case, availability of information will be to the good and will assist in avoiding delay.

However, the industry is at the start of application and procedure. We believe that the idea that it would be a reasonable course to take to begin the work by considering typical cases from each area of the District Executive Boards of the National Gas Council, quite met with the sympathy and approval of the Board. This will tend to lighten matters, and to get procedure on to a firm basis. The selection of cases from each area was made through the District Executive Boards; and last Thursday representatives of the undertakings conferred in London, so as to get into a state of unity. The industry is starting on something new and far-reaching in legislative work; and it is highly politic and important to ascertain that in regard to it the applicant undertakings are on right lines. Another suggestion which is being loyally followed, with perhaps a very few exceptions, is that other applications should not be lodged before Nov. 6. This will enable the Board to get well into the examination of the first batch of cases submitted before they have their attention diverted to other applications, which we imagine will thereafter be dealt with, as near as circumstances will allow, in the order in which they are received. But from Nov. 6 gas undertakings will lodge their applications and comply with the formalities as to notices, &c., just as best suits them. Those who would procrastinate must always bear in mind that if within two years after the passing of the Gas Regulation Act any undertakings have not applied to the Board of Trade for an Order under section 1, the Board may, after giving not less than three months' notice to the undertakers, make an Order applying to their undertakings; and this will have the same effect as an Order applied for on their own initiative. We do not think there will be many, if any, undertakings that will desire to delay. The conditions of the times are too exigent to encourage delay; and so it is more likely there will be a pressing forward rather than a hanging back—other than such as is prompted by the disinclination of some people to make any new move until they have seen how others have fared.

However, there will be no decisions for at any rate a few weeks; inasmuch as local authorities and others concerned are to have not less than twenty-one days from the publication and service of notice within which to make representations to the Board. Until that time has expired, there can be no certainty as to the sum or substance of any opposition; so that joint consideration cannot be given to any application until after the expiration of the twenty-one days, nor will it be known till then whether the Board will deem it expedient to order a local inquiry. There can thus be no definite measure of time between the application for and the granting of Orders. The period will depend upon three factors: The pressure upon the Board, the extent of opposition to realize modification of the terms sought, and the simplicity of the case and the lucidity with which it is presented. The terms granted will not necessarily be those asked for, as the Board will have to be satisfied that they are legitimate. But it is hoped that applicants will only seek terms which are legitimate, and so defensible. However, the start has now been given to the work of conversion from the cubic foot to the heat-unit basis; and a new and very interesting chapter is being opened-up in our industry.

South Metropolitan Minimum Dividend and Profits Division Plan.

IT will be remembered that, in our issue for Oct. 20, reference was made in an editorial article to authoritative pronouncements that had been obtained from the Board of Trade regarding two interesting questions that had been raised by several men in the gas industry. One was as to whether applicants for Orders under section 1 of the Gas Regulation Act could adopt, in lieu of the sliding-scale, the South Metropolitan Gas Company's plan of a minimum dividend and division of profits as endorsed by Parliament in the Company's new Act. The reply of the Board was that they did not regard section 1 of the Gas Regulation Act as enabling them to authorize an alteration of the basis of the sliding-scale. A correspondent since then, while agreeing that the principle of existing legislation in respect of maximum and sliding-scale dividends could not be altered under section 1, pointed out that such alterations had been brought about by Provisional Orders, and that in the matter of Provisional Orders the powers of the Board of Trade have been very widely extended under the provisions of section 10 of the Gas Regulation Act. Therefore, he added, so far as could be seen, it would only be necessary for gas undertakings desiring to adopt the South Metropolitan plan of a minimum dividend and division of profits first to adjust under section 1, and then to alter under section 10. The point was submitted by us to the Board of Trade; and Mr. Carlill, Assistant Secretary, Power, Transport, and Economic Department, in the course of a reply, says: "I am directed by the Board of Trade to state that "they are disposed to concur in the view taken by your cor-"respondent." This, we think, may be regarded as settling definitely the question as to whether or not it would be necessary to proceed by Act of Parliament to substitute for the sliding-scale the South Metropolitan plan. The reply indicates that it will not be; but that the change can be made through the Board of Trade, by means of a Special Order.

Are Company and Municipal Gas Undertakings Distinct Genera?

THE Gas Companies' Protection Association has a good record of work to its credit for the past year. The period has been fertile in opportunity; and the Committee have been as alert and conscientious as ever in the discharge of their duties—to the lasting benefit of the gas industry which, as a whole, is consequently the debtor of the Association. We will not dwell upon the work; the report in later columns supplies the narrative. As to the future, the legislative issues of last session supply a new and ample field within which the Association can operate with great usefulness—in fact, the aid of the Association is likely to be in larger request than ever by its constituents. There is at this juncture one thing the members deeply regret; and it is that the Chairman (Mr. H. E. Jones) has come to the conclusion that the time has arrived when he must conserve his energy by taking more rest. He is still retaining connection with the Association as a Vice-President; and, whenever called upon, he will do what he can by advice and counsel. No one can dispute the right of Mr. Jones to relief from some of the duties and responsibilities which he has taken upon himself. There is no man living of the years of our old friend who has occupied such high place in the gas industry as he has done, or whose memory can carry-back the distance in gas history that his can do, or one who has voluntarily and ungrudgingly devoted more time to its interests. He is the *doyen* of the gas profession; and respect and regard shower upon him the thanks he has won, and best wishes for health and happiness in the greater ease he is seeking, though not by any means complete retirement, from the industry's work.

There is no official announcement yet as to whether Mr. Jones will continue to occupy the chair of the Association. Anyway, the Vice-Chairman is Dr. Charles Carpenter; and whether in that capacity, or, if it should so be, in the higher one, under his guidance the activities of the Association, we may be sure, will not grow less, but in all probability will become intensified, in the interests of gas companies generally. Dr. Carpenter has for a long time held (if we have understood him correctly) the view that the interests of gas companies are a thing apart; and there was a time when he advocated the development of the purview of the Association in these interests. His opinions on this matter, if we construe rightly the speech he made at the meeting of the Association last Thursday, have not undergone change, but, if anything, have hardened. The speech showed a distinctly subjective tendency. He draws a line of demarcation between company and municipal gas undertakings; but it is a blurred line, and one which even his own speech refuses to support. That is the one matter in what he had to say—or infer—in this connection upon which we

disagree with him. On all else there is agreement, qualified by a non-concurrence in the limitation. The Association, as he says, specially exists for the protection of gas companies as distinct from gas undertakings, and therefore of the many thousands of shareholders who have invested their money in them. That is an excellent cause of existence; and the Association has done its work well. There is abundant work for it to do in future; and in the performance of this work, the same good attributes as hitherto will be found. Later in his speech Dr. Carpenter alluded to municipal gas undertakings, and said the interests of gas companies were bound up in quite a different way; and it was the gas companies who were fighting the battle, which was growing more and more keen and difficult every day. To this Dr. Carpenter referred as "another" reason to add to others he had advanced, as to why gas companies should associate themselves together to the fullest possible extent. Gas companies, we freely admit, have interests differing from those of municipal concerns; but there is a boundary to the difference, and beyond it interests merge and are distinctly common, so much so that one cannot sever the huge junction of mutuality of interest, and place in separate classes the undertakings under the two forms of ownership.

Outside the limited difference in ownership and consequently the financing and the administrative constitution, let us look into this matter, taking the report of the Committee of the Association and Dr. Carpenter's speech as the bases of consideration. Now what is there in the report of the Committee or the speech in which municipal gas undertakings (*qua* gas undertakings) are not as profoundly concerned as gas companies? They are not directly interested in the Public Utility Companies (Capital Issues) Act nor in the corporation tax, except from the point of view which Dr. Carpenter took some pains to emphasize and make clear in respect of another matter, that the progress or the reverse of one undertaking affects the progress or the reverse of other undertakings. In all the other matters in the report (other than the purely domestic ones), municipal gas undertakings are equally concerned with gas companies. They are involved in all that the Gas Regulation Act contains just as much as are gas companies; income-tax allowances affect them; reinforced concrete roads are a problem for them as well as for gas companies. Dr. Carpenter himself could not evade the acknowledgment that the work of the Association has had a valuable effect upon the "industry as "a whole"—that is to say, upon municipal as well as company concerns. When he declares that he cannot dissociate himself from the general weal and progress, he is saying something that no dialectician could construe to mean as having termination at the company boundaries. That cannot be. We take Dr. Carpenter again on his own selected ground of argument: "Supposing," he said, "a person "moves from town A, and is prejudiced against the gas "there, and moves into town B. Town B has got to "set to work to educate him, and suffers a handicap by "reason of the consumer being prejudiced by the use of gas "in town A." "So," he continued, "the fact remains that "we are all very much dependent one upon another; and "the importance of working together for our future is at "least as paramount as in many other industries." This supports our point. Suppose A is a municipal town, and B a company town; or suppose A is a company town, and B a municipal one. They would in either case be dependent upon one another in the manner suggested by Dr. Carpenter; and the importance of working together for their future is at least as paramount as in the case of company undertakings alone. Dr. Carpenter, it is only fair to point out, did not say that the undertakings under the two classes of ownership were not dependent the one upon the other. We are taking his speech as a whole, in which in another part he tried to show that the interests of gas companies were bound up in quite a different way from those of municipal undertakings. Only to a limited extent are they bound up in a different way. There is no question company and municipal undertakings are very firmly bound together in a way which cannot be ignored in the general interest.

There are brains directing municipal gas undertakings as well as company undertakings; there are influential men in the administration of municipal undertakings; and they have been greatly helpful in the political work of the industry. There are also influential men in the executive offices of municipal undertakings. These responsible men in the municipal part of the industry would not care (unless it were unavoidable) to be the recipients of the results of the efforts of a gas company's organization without they themselves could have some part and some place in the work; and that is one of the reasons for the existence to-day of the National Gas Council, which recognizes in its constitution and work the oneness of the gas industry. For the "general weal and general progress," we want the utmost continued co-operation of all gas undertakings, irrespective of ownership; and we hope everything will be done to reinforce and not to weaken the union. On no account must gas undertakings under different forms of ownership be allowed to drift apart; and there is no general wish that they should. There is a community of interests which supplies a firm foundation for the National Gas Council, between which and the Gas Companies' Protection Association there can always be (as there has been up to now) valuable co-operation.

Workshop Organization.

MOST gas-works have their workshops for doing repairs at home; in the larger works, the shops are a very important feature, and one the value of which cannot be overestimated. When one looks at the various items in revenue accounts, covering repairs and renewals, sees their growth since pre-war days, and thinks of the costs of labour and materials, a reminder is given that the workshops in which repairs and renewals of many parts of plant, meters, and domestic appliances are carried out, are places which must be invested with the finest organization in order to secure the qualities that are more than ever desirable—efficiency and economy. The increasing use of mechanical plant about the works and the enlargement of the gas business on the district are other factors contributing to the imperative necessity of doing all possible to ensure efficiency and economy in all that goes on in the shops. We do not suppose for a moment that the Leeds Corporation Gas Department put forward their workshops as models that cannot be excelled. In fact, we know they do not; but, within their present limits, there has been a very persistent attempt to organize them with the view to obtain from them "the maximum effect at the minimum cost." Impressed by the importance of this side of a gas engineer's work in these times, Mr. C. S. Shapley, the Chief Engineer of the Corporation Gas Department, chose the workshops as the central feature for the visit of the Manchester District Institution of Gas Engineers last week; and he read a paper on the subject of "Workshop Organization."

What does workshop organization mean? Some people are inclined to take a very restricted view of the meaning; others a broad view. It does not simply purport building workshops, equipping them with machine and hand tools, employing a certain number of men, and supplying them with the necessary material for carrying out their work. Organization includes system, methods to secure good results, proper registration of everything, and above all (in works with a large business) a chief responsible man technically competent, qualified to lead men and to infuse the spirit and ideal of efficiency throughout the shops, and capable of supervising without using a cross-cut saw. In smaller works, one has to be content with a foreman; but in the selection of a foreman, the nearer the approach to the same essentials, the better. Mr. Shapley had a good deal to say about the organization, the personal element, the arrangement of shops so as to avoid unnecessary manual labour, the men's environment and working conditions, and having work properly executed and finished. He gave an outline of procedure in connection with the repair and renovation of meters, cookers, and fires at Leeds. With regard to the re-test of meters, we see that they are tested for soundness at 5 in. pressure instead of 3 in., which increase is a proper proceeding; but we hope the day is not far distant when the test for registration will be not at $\frac{1}{2}$ in. pressure, but at 2 in. In the general line of work there is similarity between the Leeds methods and what obtains in all other well-appointed and ordered workshops. In such papers and inspections, however (as at Leeds last Friday), the value is chiefly found in the details. Little wrinkles often lead in the aggregate to substantial economies.

The Institution and the Juniors.

The Presidential Address which Mr. W. J. Pickering, of the Coal-Test Works of the Birmingham Corporation Gas Department, delivered to the Midland Junior Association last Thursday,

contained several parts, and touched on many matters. The official position of Mr. Pickering gives to his views on technical questions affecting works processes and operations a value which will ensure the reading of the address. One subject affecting development in professional ranks may be brought out here. Mr. Pickering hinted that there is likelihood of a definite scheme maturing which will affiliate the junior bodies to the Institution of Gas Engineers. He anticipates very large results from this alliance. For several years, Mr. Pickering remarks, many have been looking forward to the time when membership of the Institution would be as much sought after, on the ground of equality of merit, as membership of the other Institutions of the various branches of engineering. This would, of necessity, imply membership by examination, and the granting of diplomas to successful candidates. Such an arrangement, in his opinion, would attract a large number of well-trained men to the industry, which would benefit largely in consequence, while the Institution would become a real live body. We quite agree. In time, too, this might wipe out one of the two "main objections" to the adoption of more accurate testing instruments in the smaller gas-works—that is, the absence of anyone sufficiently competent to carry out tests. This was a matter to which reference was made in the address under the cross-heading "Calorific Value." The Gas Regulation Act provides a bridge over this state of things by allowing one gas examiner to be appointed to represent several authorities. Perhaps it will be as well for neighbouring small gas undertakings to jointly appoint a gas chemist to make independent tests for them, and to carry out any other test work that they may require to be done in the promotion of works' economy and efficiency.

A Strike and Training Novices.

It is impossible to get away from the questions of economy and efficiency in these times. In gas-works the two appear to furnish the only means of attacking high costs. Mr. F. J. Pearce, of the North Middlesex Gas Company, dealt freely and interestingly with the subject in the address he delivered last Friday at the meeting of the London and Southern Juniors. One of the gratifying points in the address is the allusion to that instructive incident at the Mill Hill works in January last, when the Union employees quitted their employment, and so gave the Company an opportunity of engaging new men—mostly ex-service ones—and training them. Some weeding-out had to be done; but Mr. Pearce bears testimony to the diligence of the new men in working to make themselves competent for their jobs—they took a real interest in their work, and were anxious to learn. Mark this: "Speaking generally, I can say this interest has been maintained, with the consequence that they have become, in a comparatively short time, efficient workers, and the results which are being maintained are equally as good as were being obtained with the old staff, many of whom had a life-long experience of gas-works practice."

Protecting the Public.

An Emergency Powers Act has been placed on the Statute Book. It is a measure for making exceptional provision for the protection of the public in cases of emergency. The new regulations "for securing the essentials of life to the community" will empower the Government to take measures: (1) For the preservation of the peace; (2) for securing and regulating the supply and distribution of food, water, fuel, and light, and other necessities; (3) for maintaining the means of transit or locomotion; (4) for any other purposes essential to the public safety and the life of the community. The Labour Party were strongly opposed to the measure. The trade unions are, it seems, the only people to be considered; and the Act (so it was represented) is likely to incense them. Some trade unionists have a limited horizon. Apparently, considered from their standpoint, it is no part of the duty of the Government to make provision for the protection of the great majority of the community who are not trade unionists—that is to say, if the trade unions are of opinion that the duty of the Government is not exactly in accord with the interests and policy of the unions. Fortunately, however, the Government consider they have a right to determine in which direction their duty lay—whether to provide for the protection of the entire community, including trade unionists, or to neglect this duty, and give the unions *carte blanche* to carry on a wrecking policy while the community are suffering dire privations. The powers of the Act will never be used unless necessity compels.

Unemployment Insurance.

Towards the end of the proceedings at the meeting of the Gas Companies' Protection Association, there was a short discussion, initiated by Mr. D. H. Helps, of Reading, on the question of unemployment insurance under the new Act. Several gas undertakings may be thinking of applying for exemption under the Act. The general view at the meeting seemed to be "Don't;" and Dr. Carpenter suggested that perhaps it would be well if members who were considering the matter would apply to the Committee for counsel and advice. Another matter brought to the attention of the members by Mr. Helps was an application addressed by the National Federation of Employees' Approved Societies to the Associated Chambers of Commerce, asking that Chambers of Commerce in different towns should, in view of the closing of Labour Exchanges, have notification from employers as to vacancies, and transmit them to the employees' approved society for the locality. The suggestion was sympathetically referred to; and good reason was shown.

Industrial Furnace Efficiency.

There is no general agreement as to how best to represent the efficiency of industrial gas-furnaces. It is time there was a settlement on a satisfactory basis on which the performances of different types of furnaces can be compared; for in all conscience there are in the industry to-day gas-furnace experts enough to determine such a matter. In the paper by Dr. C. M. Walter to the Midland Gas Association, reference was made to the subject. As a rule, furnace efficiency is spoken of as the ratio of the heat usefully employed in the heating of the work to the total heat supplied; but this does not give the over-all efficiency of the furnace. In Dr. Walter's own words: "It does not provide a basis on which the efficiency of the furnace from the point of view of total heat utilized in the working chamber can be computed." One suggestion offered for adoption is the efficiency obtainable on a basis of the total heat utilized (irrespective of whether it is employed for heating work or for overcoming the conduction and radiation losses in the working chamber) compared with the total heat supplied by the combustion of the fuel. Dr. Walter looks rather favourably upon this method, for reasons which will be found stated in his paper.

NATIONAL GAS COUNCIL DISTRICT EXECUTIVE BOARD MEETINGS.

FROM the Secretaries we have received reports of further annual meetings of District Executive Boards of the National Gas Council.

SOUTHERN DISTRICT.

The meeting of the Executive Board for the Southern District was held at No. 30, Grosvenor Gardens, S.W., on Monday, Oct. 25, with Mr. William Cash in the chair. Mr. Cash was appointed Chairman for the ensuing year, and Mr. A. F. Phillips Vice-Chairman; while Mr. H. C. Head, of Winchester, was re-elected Hon. Secretary, and was thanked for his most efficient services during the past year. The four retiring members of the Management Committee were re-appointed to serve for a further term of three years.

The annual report of the Management Committee, which was adopted, stated that there are now 112 undertakings in membership of the district; 20 having joined since the first annual meeting held in November last. Since the last annual meeting, the Management Committee have held seven meetings, and representatives on the Central Executive Board have attended all the meetings of the National Gas Council in London. During the year ended Sept. 30, the Management Committee have given their earnest attention to many matters of importance.

The Hon. Secretary read a letter on the subject of unemployment insurance which he had received from the National Gas Council.

Mr. Botley, referring to income-tax, said that, as regards the extra 50 p.ct. allowance for depreciation on gasholders, meters, and stoves, the Board of Inland Revenue had agreed that this should remain in force for another income-tax year—1920-1921. An instruction to this effect had been issued by the Inland Revenue to the Surveyors, and in many cases already allowed. Mr. Botley stated that he was authorized to give the information.

EASTERN DISTRICT.

The Eastern District Executive Board held their meeting at Cambridge, on the 26th ult., when the Hon. Secretary (Mr. W. W. Townsend, of Colchester) reported that twelve undertakings in the area had joined during the year. The Management Committee were elected; Mr. E. H. Parker, M.A., J.P., D.L., of Cam-

bridge was re-elected Chairman; Mr. Thomas Glover, C.B.E., of Norwich, Vice-Chairman; Mr. Townsend, Hon. Secretary; and Mr. W. H. Mainwaring, of Lincoln, the retiring representative on the Central Executive Board, was re-elected.

A resolution sent up from the Eastern Commercial Section of the Eastern Counties Gas Managers' Association was considered and adopted, asking the National Gas Council to compile monthly lists of alterations in the prices of materials and labour, such lists to be agreed with the Society of British Gas Industries, and to be made use of in the settlement of contract prices. Messrs. Fottrell and Ogilvie explained the attitude adopted by the Central Executive Board when this matter was referred to them; but after hearing the explanations, it was agreed to consider the matter further.

The annual report was considered and approved and the following resolution was proposed by Mr. Thomas Glover (Norwich), seconded by Mr. J. L. Jarvis (Newmarket), and carried unanimously:

> That this meeting of the Eastern Executive Board desires to place on record a hearty expression of thanks to the President of the Council (Mr. Milne Watson) for the great services he has rendered to the industry in connection with the Gas Regulation Act.

The meeting then passed on to the consideration of the Gas Regulation Act; and the following undertakings, on the recommendation of the Management Committee, were selected to be the first cases to be forwarded by the district: Great Yarmouth, Bedford, Colchester, and Norwich.

Messrs. Fottrell and Ogilvie gave information with regard to various points in reply to questions.

FEDERATION OF GAS EMPLOYERS.

EASTERN DISTRICT COMMITTEE.

The annual meeting of the Eastern District Committee of the Federation of Gas Employers took place at Cambridge, on Oct. 26, when the Hon. Secretary (Mr. W. W. Townsend, of Colchester) and the Management Committee were elected. Mr. Frank Prentice, of Ipswich, was re-elected Chairman; and Mr. W. H. Mainwaring, of Lincoln, was elected Vice-Chairman, in the place of Mr. A. Mitchell, of Bury St. Edmunds, who retired. The retiring representative on the Central Committee was Mr. Townsend, who was re-elected, and also re-appointed Hon. Secretary.

SOUTHERN DISTRICT.

The meeting of the Southern District of the Federation of Gas Employers was held on the 25th ult., with Mr. W. Cash in the chair. Mr. Cash was re-elected Chairman of the Management Committee for the ensuing year; Mr. Arthur Valon was appointed Vice-Chairman; Mr. J. R. H. Jacobs was re-elected Secretary; and Mr. W. E. Price was re-elected representative on the Central Committee. The representatives on the Southern Regional Gas Industrial Council for the ensuing year are: Messrs. W. Cash, F. Taylor, T. Carmichael, A. Valon, W. E. Price, J. Urquhart, H. C. Head, D. H. Helps, J. R. H. Jacobs, D. T. Livesey, C. Valon Bennett, and A. F. Phillips.

Annual Meetings of the National Gas Council and the Federation of Gas Employers.

Owing to the difficulty in securing accommodation, the annual meeting of the National Gas Council of Great Britain and Ireland, which was to have taken place on Tuesday, Dec. 14, will now be held at the Aeolian Hall, Nos. 131-7, New Bond Street, W., on Wednesday, Dec. 15, at 3 p.m.

The annual meeting of the Federation of Gas Employers will be held at the same place on the same date, at noon.

PERSONAL.

We learn that Mr. JOHN F. SIMMANCE has ceased to take an active part in the firm of Messrs. Alexander Wright & Co., Ltd., although his services are retained in an advisory capacity. He, with Mr. JACQUES ABADY, formed the Company in 1896 (the original firm being founded in 1843); and in 1911 Mr. Jacques Abady left the Company upon being called to the Bar, but retained a seat on the Board. Mr. J. WEATHERALL FOREMAN, M.Inst. Mech.E., whose connection with the original firm and the Company has existed for 34 years, is now Managing Director.

An interesting presentation took place at the Smethwick Gas-Works last Saturday, when the Engineer (Mr. Vincent Hughes), on behalf of the staff and workpeople, presented a handsome gold watch and pendant to Mr. A. DOUGLAS COOKE, on his retiring from the position of Assistant Engineer. The watch was inscribed: "Presented to A. Douglas Cooke, Esq., by the staff and workpeople of the Smethwick Gas-Works, on his retiring from the position of Assistant Engineer after sixteen years' service." Representatives from each department referred in eulogistic terms to Mr. Cooke's work during the time he had been at Smethwick, and Mr. Cooke feelingly acknowledged the presentation.

The coke-oven production of tar in the United States in 1918 was about 263,000,000 gallons, or about two-thirds of the total output.

ELECTRICITY SUPPLY MEMORANDA.

ALL the experience that has been gained in the making of Orders by Government Departments during the war has not resulted in the practice that makes perfect in regard at any rate to the subject-matter of some of the clauses. A case in point is the provision, in the Light and Fuel Order issued at the beginning of the coal strike, which enacted: "Where gas or electricity is required for power in any premises within the scope of Part III. of the Coal (Emergency) Order, 1920, its supply and use shall be restricted so that not more than 50 per cent. of the weekly average quantity supplied or used for power in the four weeks last preceding the issue of this Order coming into force shall be supplied or used in any week." This is one of the instances where it is easier to prescribe than it is to fulfil. In the first place, from high government places industries were asked to keep running as long as they possibly could, so as to do something to mitigate the miseries that come from widespread unemployment. The Federation of British Industries also issued an appeal to manufacturers to the same effect. To cut-down power requirements to 50 p.ct. would be one of the surest ways of bringing about a vast amount of unemployment. Then some forms of machinery cannot be brought down to half their fuel consumption without losing a great deal of their efficiency, and causing loss to be incurred throughout the factory. We suppose the designers of this provision acted on the principle that "half a loaf is better than no bread," without considering how it was possible to give effect to the reduction. Then, again, this provision places the manufacturers who used more power than heat at a disadvantage in comparison with others who require more heat than power; and altogether it would make the position of those who were caused to suffer through the halving of industrial power infinitely harder than that of others who were not dependent on gas and electricity, but had by them a good stock of coal or coke and steam-operated plant. Again, in the case of gas, many industrial establishments use it through the same meter for light, heat, and power; and some employ it for heat and power only. How in these circumstances it would be possible to ensure that only 50 p.ct. of the weekly average of the amount used for power in the four weeks preceding the date of the Order, and how anyone is to know how much was used in those four weeks, is a mystery, unless the factory closed-down for 50 p.ct. of its working time. It would be impossible to have inspectors on works to see that only 50 p.ct. of the power was used; and moreover they would not know what was 50 p.ct. These latter points were raised with the Mines Department by the National Gas Council; and the Department, appreciating the difficulties, have informed them that they will be satisfied if individual undertakings will continue to read the meters at the usual periods, and notify consumers whose consumption is in excess of that specified in the Order. This looks like an instruction to ensure the utmost economy, without being too nice over it. However, we are hoping that the intentions of the provision will not be required on this occasion; but should a similar state of affairs come about in future, the objectionable and impracticable points of the provision might be borne in mind by those responsible for the framing of these Orders.

Order Making Easy; Difficulty of Compliance.

Troubles of the Small Undertaking.

The troubles of small electricity supply undertakings have been very acute the last few years; and with costs what they are, there appears to be no chance of an early abatement. One has to get habituated now to the new standard of costs; for there is little probability of any recession of a substantial order from labour and coal charges, and materials of all kinds will therefore continue at a level that will not be far below the current order of things. Illustration of how the smaller companies have suffered is supplied by Chelmsford, where the electricity service is run by the Electric Supply Corporation. An inquiry has been held there into an application to raise the statutory maximum charge, so as to enable the Company to put the price of current at 1s. 0½d., less ½d. discount; the consumer to pay for a minimum of 15 units in a winter quarter and 10 units in a summer quarter. The 1s. will be exactly double the charge before the war, as 6½d. was then the price less ½d. per unit for prompt payment. In 1919, there was a deficit of £759; and the estimated debit balance for this year is £1392. The average profit for the three years before the war was £2720. Including depreciation and the former profit, the loss in 1919 was £6652, and this year £7656. The cost of coal has risen from 17s. 6d. per ton in 1914 to 46s. 10d. now. The shareholders have had no dividend for four years; and yet there was some opposition to the part of the proposal referring to the minimum charge, on the ground that many shopkeepers do not use a single unit in the summer time.

Increase of Maximum Charges.

Those particulars are instructive of the difficulties electricity concerns—particularly the smaller ones—have had to face. As in the case of gas undertakings, a considerable number have had to make application for an increase of their maximum prices—first to the Board of Trade, and now to the Electricity Commissioners. The "Electrician" does not

hold out any hope of applications for increased charges ceasing for some time to come. Our contemporary sees the obvious. Such increases militate against the extension of electricity supply. Naturally. It comforts itself with the thought that a maximum charge of 1s. or 10d. per unit only represents about 50 p.ct. above the previous maximum. Just so. But where 1s. or 10d. per unit is charged to-day (1s. 2d. is not unknown), it is not a 50 p.ct. increase on the pre-war charges; it is something considerably more. The new minima of 15 units for each winter quarter and 10 units for each summer quarter are approved as being fair, though there is great opposition on the part of consumers. There is no minimum charge in the case of gas. All the consumer has to do is to pay for the gas consumed whether it be large or small, *plus* meter and stove rent. There is also allusion by our contemporary to the economic limit in price beyond which it is not wise to go. We referred to this matter in the "Memoranda" for Oct. 13. Some people put the economic limit of charge at 1s. per unit, and others say that it would be quite all right to go beyond 1s. This, however, is for lighting only. The line of advance for which electrical men appear to be yearning, despite physical disabilities, is that of heating; but our friends are very shy of committing themselves when asked for their views on the economic limit of price for heating purposes. The economic limit is governed largely by the price of competing commodities, whether it be for lighting or heating or anything else. Moreover, what would be the economic limit for Mayfair would not be the economic limit for Suburbia, or for some provincial towns. We quite agree with our contemporary that it is not good policy (if one can do without it) to get from consumers as much as they can be induced to pay. This, of course, is a policy that does not encourage consumers to extend the applications of electricity. But we are reduced to the bald fact that an undertaking to be financially sound must obtain a living return from its business—a return which will enable it to meet its expenses, including capital and depreciation obligations. Our contemporary is also concerned about the dividends which are being allowed under the Statutory Undertakings (Temporary Increase of Charges) Act when an increase of maximum price is granted. It is, in its view, sheer mockery to allow only three-quarters of the pre-war rate of dividend; and it wonders what happens in the case of companies that were not paying dividends before the war, The Act provides for three-quarters of the pre-war dividend or of the statutory maximum dividend, whichever is the lower. If a company did not pay dividends before the war, and can do so now with a revision of price, then it can fall back on three-quarters of the prescribed maximum dividend. It is also not clear to our contemporary whether the average pre-war dividend or the highest dividend paid in any one year is meant. If the writer of the article had taken the trouble to refer to the Act, he would have found that the "pre-war dividend" is the average of the dividends paid during the three years preceding the war.

To Develop the Weaklings.

Another article the "Electrician" heads "A Word to the Wise." As we read what follows the title, seeing that it in large part consists of counsel which our friend considers good, it seems to us that a mistake has been made, and that the heading should have been "A Word to the Foolish." It speaks of the decadence of the small electricity undertakings; and there is an admission of bad finance. The conditions of to-day, we read, have helped to call attention to the "sandiness" of the foundations upon which many of these undertakings have been built. Notwithstanding wonderful estimates and great rejoicings at the time of their births, the "sandiness" was recognized by many people years ago. The remedy now being applied is to increase the charges for current; but this our contemporary does not regard with any large degree of approval, though money has to be got from somewhere. He would prefer that the undertakings should go to the root of the evil. What is wanted is a new spirit in the management, and to realize that there is a field at their very doors that will pay for development. There is a little vagueness about this. It is not explained what is to be done in making ends meet and in paying dividends on capital and satisfying the claims of depreciation between now and the period when development has been actually made, and development of such financial soundness that it will provide profits sufficient to meet all expenditure and other claims. What field is it that is to be developed? Is it the heating field with electricity at 2d. or 3d. per unit? Our contemporary speaks of its "suggestions." The nature of them is cloaked in a great nebulosity; but it seems that they are the suggestions rather of Hereford than of the "Electrician." At Hereford, the Engineer has been busy, in an agricultural area such as few electricity undertakings have within reach, over some years now in developing electrical operation, using overhead wires. Local circumstances vary greatly; and moreover, such development work will never again be carried out at the same level of capital expenditure. Money, cables, plant, and electricity are all dearer. Yet our friend is optimistic as to the excellencies of his panacea. Before, however, money can be obtained to spend on development work, it is necessary in these times to show the public that the existing capital is receiving an adequate dividend. We take it that, in the opinion of our contemporary, the men are not wise who are not doing the same thing as Hereford; and therefore they must be foolish. It is to such that the article is really addressed. But how easy it is to say: "Go thou and do likewise;" how difficult it is—to-day more than yesterday—to be clothed with the money, the conditions, and all else that is necessary for the purpose.

Hiring of Electric Heaters.

Recently we have been urging the earliest possible revival of the hiring system by gas undertakings where it has been discontinued owing to the conditions as to supplies and costs. Electrical undertakings are applying the system wherever it can be done, and are making use of the coal position and prices for boosting-up the demand, on the ground that, the user being able to switch-on and switch-off, electricity provides an economical method. We read that the Westminster Electric Supply Corporation are sending out notices which "tell of electricity for cooking, heating, washing, and such purposes at 1½d. per unit; and in view of the high cost of coal, which is not going to be reduced by the present industrial trouble, many of the consumers will without doubt become customers for the electric fires which the Company hire-out at half-a-guinea a year." We are not so sure about the "many." The householder can turn-on and turn-off a gas-fire to suit his convenience; and at the present price of gas, he can obtain something like 13,500 B.Th.U. for 1½d., and at 75 p.ct. efficiency can transfer to his room some 10,000 B.Th.U., compared with 3420 B.Th.U. for the 1½d. paid for electricity, assuming the correctness of the claim for the electric radiator of 100 p.ct. heating efficiency. We only assume this efficiency, having very good ground for not accepting it. For 1½d. 4·7 lbs. of coal can be purchased at 60s. per ton; and allowing that this quantity of coal has a potential heating value of 58,750 B.Th.U., and the coal fire an efficiency of 20 p.ct., then 11,750 B.Th.U. are sent into the room for 1½d. We are not disposed to agree with the view that "many" consumers will become customers for electric-heaters, despite the price of coal. They want something that approaches nearer to the value given by the coal fire.

Electricity in Housing Schemes.

It is noticed that the Newcastle-upon-Tyne Electric Supply Company have erected a number of houses for the employees at the North Tees Power Station. Of course, they had no option but to fit-up these houses for electrical operation, excepting a coal fire in the sitting-room, which is to be used, it is understood, for providing comfort and a supply of hot water. Thus in the summer time, when a supply of hot water is required, the coal fire may be expected to provide discomfort in the sitting-room. The estimated electricity consumption of the different types of houses is 3780 and 3480 units per annum. We should like these figures divided between heating and lighting, and charged-out not at the price the Company will be charging their own employees, but at the prices that obtain in so many localities of 10d. or 1s. per unit for lighting, and 2d., 2½d., or 3d. for heating. It is stated that actual tests show that a meal (of what it consists is not mentioned) for six persons can be cooked for 5·27 units. At 2d. per unit, this would cost about 10½d. The B.Th.U. expended would be about 18,000. The South Metropolitan Gas Company to-day are only charging 2d. for 20,000 B.Th.U.

ELECTRICALLY PRODUCING GAS.

A Scheme by Mr. J. Mogford.

A FORTNIGHT ago, in a leaderette in the "JOURNAL" [p. 135], reference was made to the subject of the generation of explosive gas by the rise of temperature in electric cables gasifying the insulating material. In the course of the paragraph, it was remarked that "the day may come when such demonstrations by electricity will suggest to some inventive mind a means of utilizing electric current for generating gas for town supply." It seems that we were in arrear with the idea. Mr. J. Mogford, the Gas and Electrical Engineer of Briton Ferry, some time ago conceived the notion of utilizing the electric arc for coal carbonization; and he offered the suggestion to Mr. C. H. Merz in the autumn of 1918, and, on his suggestion, provisional protection was secured from the Patent Office. Mr. Merz was then interesting himself, and we believe is now, in a system of carbonization which, if successful, he proposed to combine with the generation of electrical energy. It seems that Mr. Mogford's proposal does not fit-in with the rest of Mr. Merz's scheme; but that makes it none the less interesting.

The leaning of some men whose minds are occupied with carbonization development is now towards applying heat direct to charges of coal rather than to heating the retorts externally; and the reasons are well known to gas men. Mr. Mogford states them when, in his provisional specification, he says: "The principles involved in distillation at high temperature are: (1) The rapid transfer of heat to the material to be distilled. (2) The maintenance of a vacuum in the distilling chamber or retort. The utilization of refractory material for the construction of externally heated retorts and chambers is detrimental to the attainment of these objects, inasmuch as the refractory material is of low conductivity and porous. The low conductivity retards the transfer of heat through the walls of the retort or chamber, and the porosity opposes the maintenance of a vacuum, and permits the adulteration of the gaseous distillates by the admission of atmospheric and furnace gases."

To put the matter briefly, Mr. Mogford proposes to overcome these difficulties by maintaining the heat necessary for distillation in the interior of the retort or chamber by means of the electric arc. The scheme provides for part of the retort or chamber being maintained at a high temperature by electric arcs; the carbons being sealed by a water lute, and fed in the usual manner. It is contemplated that the fuel to be distilled shall be propelled through the heated zone by gravity or mechanical power. The retorts or chambers would be constructed of such material and in such manner as to be air-tight, and to be lined internally with refractory material. They may be vertical, inclined, or horizontal, or in combinations of these methods of building; or the fuel may be carried through the heated zone by means of chain or other conveyors, or rotary carriers. Steam may be admitted during distillation for the conversion of all or part of the solid fuel into gaseous products.

That is a general outline of the scheme, which was also submitted to the Inventions Department of the Ministry of Munitions, who did not regard it altogether favourably—apparently the principal ground of objection being that electric power is not available in this country at a rate cheap enough to justify its application for the purpose. Consequently, the Controller decided that he would not be justified in recommending any action on the process on the information at present available; but he expressed his willingness to reconsider the decision in the light of any experimental data which Mr. Mogford might obtain in support of the process.

As Mr. Mogford informed the Department, a process of the kind requires money and facilities for experiment and development; and, of course, both disabilities are a drawback to many men who originate promising schemes. A paragraph from a letter which Mr. Mogford sent in reply to the department may be quoted as showing his belief that the proposal is at any rate worth a practical trial: "No experiments have been carried out in confirmation of the advantages I allege in my specification; but I have had thirty years' experience in coal distillation, and know the disadvantages of the process as at present carried on. I have a knowledge of the cost of current for electrical steel smelting, and electrical heating generally, and am convinced that the costs for the arc necessary for the process I describe would be small compared with that required for steel smelting, and that, with the prospect of cheap electrical power, the greater yield of distillates from the higher temperature, and the other advantages I allege over present practice, the process would advance the coal distillation industry."

Although it may be regarded as a revolutionary—we were almost writing "retrograde"—idea to utilize an agent the generation of which shows such low thermal efficiency for a high thermal efficiency carbonizing process, we should like to see an experimental trial made of the idea, to ascertain whether it is workable, actually what (if any) advantages would accrue, and what would be the likely costs. Any definite judgment can only result from definite trial.

Experiment Stations of the Bureau of Mines.

The Joseph A. Holmes Memorial at the Pittsburgh experimental station of the United States Bureau of Mines states that he was the organizer and first director of the Bureau, and leader in the movement for safety in mining. He died in July, 1915, or five years after the Bureau of Mines was established. Though it is thus by no means old, the Bureau has done much good work, including numerous investigations that have proved of high value to the nation. There are associated with it eleven experimental stations, situated in the mining fields, and closely in touch with industrial needs. The different stations are the subject of an illustrated description by Mr. Van H. Manning, who says that in some branches of mining the small independent operator is greatly handicapped. Even though he may hear of improved methods, he cannot himself afford to undertake experiments that may or may not prove successful. The great mining companies carry on research work, some of them on a large scale; but as this is usually done for purposes of gain, these companies do not feel under any obligation to give to the world the results of their investigations. The solution of the difficulty is to place in mining districts trained engineers, who will deal with the problems for the benefit of the whole industry. These experimental stations have therefore been established, with the object of investigating economy, efficiency, and safety in mining, and to make public the results of the investigations. The aim is ultimately to cover all mining areas; and Congress has authorized the opening of additional mining experimenting stations from time to time. A great deal of the work of the Bureau has had relation to coal mining, oil wells, and natural gas utilization. For the purpose of mine rescue and safety work, the country is divided into districts, with seven safety stations and eight mine-rescue cars, and also three rescue trucks for general training work. Both stations and cars are equipped for rescue work and first-aid training.

The death occurred, on Friday, Oct. 22, at the age of 43, of Mr. Philip Lancaster, Engineer and Manager of the New Mills Gas-Works. He was a native of Oldham, and was appointed by the New Mills District Council as their Gas Manager in 1904, when only 27 years of age. During the time Mr. Lancaster held the position, the works were very considerably improved and enlarged.

NEW "CLASSIC" GAS-GRATES.

Messrs. John Wright & Co.'s Designs.

THE "menu" provided in the new winter catalogue just issued by Messrs. John Wright & Co. has the double attraction of combining certain elements that are already known and valued by their clients and the industry generally with the disclosure on a large scale of what is at once new and of great interest. The list is devoted in its entirety to illustrations and particulars of the firm's new "Classic" gas-grates; and there is presented in this series a wide range of designs.

Emphasis is laid by Messrs. Wright & Co. on the introduction this year in all these gas-grates of the new "Thermo XX" radiant. This forms a fire-front for which distinct advantages both in radiant efficiency and in radiant appearance are claimed—advantages in appreciable excess of even the best results of the well-known "Thermo X" radiant. The patent "injector-ventilating" construction is embodied in the "new grates;" and they have the necessary provision for the pedestal and bracket patterns of the side boiling-burner, if desired.

Coming to the individual gas-grates, one has a sense, in turning over the leaves and studying the illustrations of the various patterns, that a new note has been struck, and a standard of refinement, even excelling the firm's previous highest, aimed at and attained. A great point is justifiably made in the book of the degree in which the firm's artists have succeeded in recapturing the inherent spirit as well as the atmosphere of the "Adam" style in its most delicate forms, and embodying these in a variety of choice creations such as the range of grates constituting this "Classic" series. The grates lend themselves to the "built-in" principle, which carries with it in so great a measure the prospect and hope of the future in the popularization of domestic gas-heating. Most impressive is the "Raphael" dog grate, designed for standing in a tiled recess. The silken effect of the finish in the "Raphael" shows a perfectness of surface which is not only striking in itself, but is an admirable set-off to the design.

The *pièce de résistance* of the new programme is the group of three fires—square-topped, round-topped, and ledge-topped respectively—the "Vandyke," "Rubens," and "Chantrey." The design of these is of studied plainness; the chief attraction residing in the grace of the lines of the design. A very large general demand is anticipated for this group of three grates, which are so constructed that they can be used as "built-in" gas-grates when so desired.

The "Inigo," the "Holbein," and the "Verdi"—with square, round, and ledge top respectively—are similar in design to the three last named, but have a handsome reflecting fender with upright dogs. The "Classic" series is specially well provided with the type of gas-grate which can either be used as an ordinary gas-grate for general uses or as a "built-in" or semi-built-in grate. The "Virgil" and the "Cicero"—respectively square and round-top grates—have a charming design of the "Adam" character.

Intermediate between the ordinary "built-in" gas-grate intended for use where there is no existing coal-grate to be covered, and grates of the "Angelo" type which completely mask existing coal-grates, comes the "Rembrandt," which is of suitable height to fit closely within the outer border of a coal-grate; so that the combined effect is that of one grate only—and that a gas-grate. Of "built-in" grates pure and simple, an attractive example is the "Sarto," which is similar in design to the "Rembrandt," but is not intended to stand in front of a coal-grate.

The next two "built-in" gas-grates have a particular interest of their own, in that they embody special provision for those houses in which a gas-grate of smaller size and correspondingly moderate price is the *desideratum*, while at the same time retaining precisely the same quality of taste and art in design that characterizes the larger and more expensive types. For such conditions, the "Millais" and the "Leighton" will both be found peculiarly adapted; and they will also commend themselves to owners or builders of large houses for use in rooms of smaller size or secondary importance.

To many gas consumers a centre of extreme interest both for novelty and utility will be found in a new inset gas-fire which is also illustrated in Messrs. Wright's catalogue and which is named the "Hotspur." This is the newest variety of the type of gas-fire designed to be placed in the interior of an inset coal-grate, and so transform the grate into a gas-grate; and high claims are put forward by the makers as regards its efficiency, convenience, and attractive appearance.

All these grates have their standardized parts interchangeable, not only with each other, but with similarly standardized grates made by the other "Radiation" firms. Taken both in detail and as a whole, this 1920 gas-grate catalogue may well be accorded the supremacy over all the firm's previous seasonal programmes.

Electrically Generated Gas.—Mr. J. G. Tooms, of Christiania, writes: In the "JOURNAL" of Oct. 20, you state the day may come when a means will be found of generating gas for town's supply by means of electric current. I take it, therefore, that it will be of interest for you to learn that in Christiania we are commencing the erection of a full-scale vertical retort, in which the coal will be distilled by direct electricity. I hope in some months to be in a position to give particulars and results.

BRITISH COMMERCIAL GAS ASSOCIATION.

The Sheffield Conference.

To-day we conclude the report of the proceedings at Sheffield on Oct. 19 and 20—under the presidency of Sir Robert Hadfield—by dealing with a few items of the programme which could not be covered in the report given last week, pp. 196 to 210.

In the course of the Wednesday afternoon two papers on "Fuel Research" were contributed by Prof. John W. Cobb, C.B.E., B.Sc., F.I.C., and Prof. A. H. Barker, B.A., B.Sc. They were as follows:

FUEL RESEARCH AT THE UNIVERSITY OF LEEDS.

By JOHN W. COBB, Livesey Professor of Coal Gas and Fuel Industries in the University of Leeds.

Research on fuel at the University of Leeds has for several reasons centred very specially on matters of interest to the gas industry. One is that gaseous fuel is intrinsically so interesting, important, and attractive, from the very beginning, to any investigator seeking efficiency and cleanliness. In addition, there are special reasons which have determined, to some extent, the orientation of our services.

LIVESEY CHAIR.

The Livesey Chair at the University of Leeds was endowed by the gas industry as a fitting memorial to a great leader, who believed in his day that sustained and patient research was a vital necessity for the continued success of his industry, and who not only held this belief, but acted upon it. Research on the problems of the gas industry, therefore, attaches naturally to the department over which the Livesey Professor presides, and which carries the stamp of that connection in its name—the Department of Coal Gas and Fuel Industries. In order that the co-operation of the industry should not cease with the endowment of the chair, but should continue to be effective, the gas industry, through the Institution of Gas Engineers and the Society of British Gas Industries, has always been represented by distinguished members on an Advisory Committee dealing with this particular department—so following a custom which the University had already established in connection with its other technical departments. This method of working had been found to be useful there; but nowhere has it been, I believe, more successful than in the Department of Coal Gas and Fuel Industries.

RESEARCH COMMITTEE.

There is another way in which the link between the industry and the university has been strengthened; and that is by direct co-operation between the representative councils of the gas industry and the university, through a Joint Committee for the purpose of research. This Joint Committee of the Institution of Gas Engineers and the University of Leeds has been in existence since 1907, under the chairmanship of Professor Smithells, whose services in connection with it and with the whole process of co-operation between the industry and the university can hardly be over-valued. Investigation controlled by such a committee has the obvious advantage of drawing, through its members, upon experience of different kinds. It can secure that the choice of the work in the first instance shall be guided by the double appeal of technical value and scientific interest, and that, during the carrying out of the work, criticism and counsel shall be offered from different standpoints. The existence of the Research Committee has also the advantage of establishing confidence in the ranks of the industry that the expenditure, which must be incurred if research has to go on, is incurred to good purpose. At least once a year (at the June meeting of the Institution of Gas Engineers), the Committee give an account of their stewardship by a full report on the work which has occupied attention during the preceding twelve months—receiving praise or blame, deserved or undeserved. It is primarily of researches carried out under the auspices of this committee that I shall speak on this occasion, rather than more individual work. Their supervision is entrusted to the Livesey Professor; but, particularly when work has to be carried on away from Leeds, it is plain that great responsibility must rest with the research chemists who are solely occupied upon it and who give up their whole time to it. It is thus one of our first cares to make a wise choice in the filling of these posts. In this respect, we believe we have been very fortunate; and I am certain that I am speaking for every member of the Committee when I say that, in apportioning any credit due for the work carried out by us, and reported upon, a large share should be given to the men who have in succession held the post of Research Chemist to the Committee.

GAS-HEATING RESEARCH COMMITTEE.

I think it will be generally agreed that the gas industry made a great step in advance when it decided to act along with the University of Leeds in giving scientific investigation to the position of the gas-fire; and the reports of the Joint Committee (the Gas Heating Research Committee) on this subject were not only interesting and useful in regard to the particular subject, but were a great testimony to the success attending this first example of co-operative research. The work was carried out while Prof. Bone held the Livesey chair—before my time, although I was able to give some little assistance in connection with it. Dr. Drugman was Research Chemist during the preliminary period, and later Dr. E. W. Smith, who at the meeting of the Institution of Gas Engineers in 1909, gave the first account of the method of determining the radiant efficiency of gas-fires which has since been known as the "Leeds Method," and has, in one form or another, come into such general use. One of the best evidences of the value of this piece of work is the extent to which makers of gas-fires since that time have established scientific departments of their own, which have not only served their firms, but have also made valuable contributions to technical literature. This is as it should be. A university laboratory may be, and we hope sometimes is, a centre for the research of an industry. From it one can often attack the problems of interest to the industry as a whole. There is certain work of this kind which it is particularly fitted to perform; but it can only exercise its full usefulness when the men it trains pass out into the industry, and engage in the solution of the many special problems which inevitably present themselves to firms, companies, and gas authorities, and are likely to do so to an increasing extent.

VENTILATION RESEARCH.

The next piece of work which was taken up by the Committee was the study of ventilation in connection with gas-fires and lighting-burners. It was a recognition of the important principle that heating and ventilation are interdependent and should be considered together. The gas-fire, like the coal-fire, is the agent in any ordinary house (particularly a small house) upon which reliance is placed to effect ventilation; and no method of heating which ignores this necessity will survive. There is no doubt that, along with a mass of unfounded criticism rising out of mere prejudice, there was an element of truth in some strictures which had been passed upon the older gas-fires, because they were constructed with so small a flue outlet, and generally so fixed that the ventilation provided was inadequate. It was, however, proved clearly by the work of the Ventilation Research Committee, which was carried out under my supervision (with Mr. Harrison as Research Chemist), that this drawback could be easily removed. A special building was erected at the university—a room within a room—for the purpose of this inquiry, in which experiments could be carried out with the minimum of interference from fluctuating atmospheric conditions. It was then possible to obtain definite figures for the ventilating effect of gas-fires (and lighting burners) under specified conditions. It was conclusively proved, for example, that a modern gas-fire burning 30 c.ft. of gas per hour could remove 10,000 c.ft. of air from a room per hour (or a smaller quantity if required), and this with the use of quite a short chimney flue. It also became plain that in the design of rooms and flues, and in the fixing of gas-fires, careful consideration should be given to the resistances which might be interposed to the flow of air. Ventilation, however, can be overdone. The open fire exercises a cooling effect in a room by drawing cold air into it—particularly if it is a fire of low radiating power; and this is sometimes the first effect of lighting a fire. Mrs. Fishenden has shown that the large and uncontrolled draught of the ordinary coal fire is mainly responsible for its wastefulness. This inquiry of ours was stopped at a most interesting point by the war, just when we were transferring our attention from what one might call the figures for standard performance such as we obtained in our special building, and were starting on a comparison with existing installations with a view to the possible correction of shortcomings. We are waiting an opportunity to resume this work. The reason we have not done so already is that the conditions imposed by the war upon the gas industry, and still operative in a changed form, brought to the front insistent questions of an entirely fundamental character.

GAS EFFICIENCIES AND STANDARDS.

The increasing necessity to save labour and fuel have made the Government see the wisdom of encouraging those methods of using fuel which make for coal conservation and economy; and they have, at any rate, taken one step in this direction, so far as the gas industry is concerned, by the removal of vexatious restrictions which had ceased to serve any useful purpose. In 1916 the Research Sub-Committee discussed this matter, and came to the conclusion that the old standards for gas could never in reason be re-imposed. They represented to the Institution of Gas Engineers the pressing necessity which the industry was under of being able to form on a sound basis an opinion as to what the public gas supply ought to be, and what limitations should be imposed in the public interest. There was no consensus of opinion, well-founded or otherwise, in the industry at that time; and it was suggested that experiments should be set on foot at once on the relative thermal efficiency in use of different grades of gas.

In 1917, the experiments were started; Mr. James W. Wood being appointed as Research Chemist. The Gas Investigation Committee of the Institution were appointed in order to deal with the many aspects which such an enquiry presented. We have had the assistance of the industry in carrying it out, particularly from the Birmingham Corporation Gas Department, who helped us in many ways—especially by placing us in a position to draw upon a large range of gas compositions for our experiments. When Sir George Beilby and the Fuel Research Board were called upon by the Board of Trade to advise them on new standards for public gas supply, they found themselves in want of exactly the kind of information which we had set out to acquire; and when the Institution of Gas Engineers were asked for an

opinion, they were able after a little time not only to give one, but to give sound reasons along with it.

I do not wish to enter into technical detail, but may say that the results of this work, which have formed the subject matter of three reports, can very roughly be summarized by saying that they provide an endorsement for the recommendation of the Fuel Research Board that the supply of heat units should be made the basis in charging for gas, and that wide ranges of calorific value should be allowed in order to permit of economical methods of manufacture without prejudice to public interest—a proviso being made, however, that whatever calorific value be chosen by the supplying company or authority the standard should be scrupulously examined and carefully maintained. It is proposed to check gas quality on the evidence of a recording gas calorimeter; but it can probably be taken for granted that the authorities have not lost sight of the very great difficulties which have been encountered in the past by all who have attempted to secure an entirely reliable and continuous record extending over any considerable period. The Research Sub-Committee have at present one or two instruments under careful test, because it is obviously desirable to know what are their excellencies and limitations.

MANUFACTURING EFFICIENCIES.

While this investigation was in progress, it became evident that bound up with it was the question of the relative economy in various processes of gas manufacture. The use of the most economical processes can only be brought about when it is known not only what are the relative efficiencies of different grades of gas in use, but also what are the relative economies of different methods of manufacture. In relation to the question of coal conservation, the gas industry has a very strong position, arising largely out of the fact that carbonization is not a wasteful process, but is thermally efficient (relatively very efficient), yielding its three main products—gas, coal, and tar, with little thermal loss and useful bye-products at the same time. Its ultimate economy is heightened by the high efficiency which attaches to the use of gaseous as compared with solid fuel; but there is room for great advances. The difference is still too great between the price of a thermal unit in gas and in coal, although for many purposes, apart from considerations of cleanliness and convenience, the higher efficiency of gas in use makes the balance swing in its favour. The industry must, therefore, keep itself informed as to what can be done to improve the economy of its manufacturing processes. The Gas Investigation Committee realized this, and commissioned our Research Sub-Committee to take up work along those lines, and to commence by an investigation of the steaming process in continuous vertical retorts.

Valuable facilities were offered by Mr. Lawrence Hislop and the Uddingston Gas Company, who placed their works at our disposal. Dr. A. Parker was the Research Chemist with two assistants; and a report was issued at the meeting of the Institution of Gas Engineers last June. It dealt not only with the increase of gas obtainable by steaming, but with the whole technical balance-sheets attaching to the process. The yields of different products were ascertained; a heat balance was drawn up; and chemical balance-sheets prepared showing in what form and quantity the carbon, nitrogen, and sulphur present in the original coal appeared in the products. With the range of steaming that we employed, the yield of gas per ton of coal was approximately doubled, and the heat units in the gas were increased from 5 to 8 millions. Steaming in a gas-retort may be regarded as the manufacture of water gas inside the retort; and it is both interesting and useful to know how the process compares with the manufacture of water gas in external generators. Both methods aim at securing a larger proportion of the total heat of the coal in the gas by gasification of the fixed carbon. If the whole of the fixed carbon were so gasified we should, of course, arrive at what is known as complete gasification of the coal, on which some experiments were made at Uddingston, and were dealt with in the report upon the work. We are now engaged upon an investigation of the blue water gas process, and are hoping to produce balance-sheets for it similar to those already issued for steaming in vertical retorts.

OXYGEN.

On the same subject—economy in gas production, but not as work by the Research Sub-Committee—my colleague Mr. Hodsman and I have submitted a paper of a somewhat speculative character, entitled "Oxygen in Gas Production." The substance of its findings is that the cost of oxygen is almost certain to be very materially lessened in the near future, and that as soon as this happens a continuous process of gasifying coal with oxygen and steam is likely to be quite practicable, and to offer great economies, not only in thermal efficiency, which it is calculated may very well reach 90 p.ct., but in the cost of constructing and operating the plant.

I will mention a paper which has been recently submitted in Switzerland by Herr H. Zollikofer, the Secretary of the Société Suisse de l'Industrie du Gaz et des Eaux, because it shows how special conditions come in to determine the most promising lines of advance for different times and places. The author refers to the strong position of leadership which the British gas industry has regained in its determination for progress; deals with the Uddingston experiments, which he regards as of outstanding importance; and goes on to point out what special interest the proposals which Mr. Hodsman and I made in our paper, "Oxygen in Gas Production," have for Switzerland, where fuel is dear and water power available. He has in mind the production of oxygen at a very low cost by utilizing electrical energy produced by water power during the night time—the oxygen to be afterwards used for gasification. The author, in a letter to me, says that their Association are making research to find out how far the proposed process is technically realizable; and my own view is that it is a great pity if we in this country do not take steps to put ourselves in a position where we can take advantage at once of the cheapening of oxygen, as soon as it comes about, or even help to bring it about.

GAS RESEARCH FELLOWSHIP.

Any account of research at the University of Leeds would be incomplete without mentioning work that has been conducted by the holder of the Gas Research Fellowship. This fellowship is endowed by the gas industry, and is held for the prosecution of post-graduate research in gas chemistry. It was held in Professor Bone's time by Mr. Forshaw, who worked on "The Illuminating Efficiencies of Carbon Monoxide and Hydrogen, used in conjunction with the Incandescent Mantle," and Dr. Hartley, whose subject was "The Electrical Condition of Gold and Silver Surfaces during the Absorption of Gases and their Catalytic Combustion." In 1913-14, Mr. Hollings held the fellowship; and the results of the work done then were submitted by Mr. Hollings and myself to the Institution in the form of two papers—one entitled "Thermal Phenomena in Carbonization," and the other "The Decomposition of the Volatile Products of Carbonization by Red-Hot Coke and Radiant Heat." During the war the Gas Research Fellowship was not held; but Dr. Dufton collaborated with me in an honorary capacity, in a study of the decomposition of benzene and toluene at high temperatures. This was largely a continuation of Mr. Hollings' work to two constituents of gas and tar which had assumed a very special importance. At the present time Mr. Monkhouse holds the Gas Research Fellowship, and is continuing the work with respect to ammonia.

REFRACTORY MATERIALS.

Mr. Houldsworth, my Research Assistant and Assistant Lecturer in Refractory Materials, is occupied with the thermal expansion and contraction of fire-bricks and other furnace materials, which, although not strictly speaking research on fuel, is so closely allied to it that I am, I hope, justified in mentioning it in this connection.

This bird's eye view of the fuel research carried out at the University of Leeds, and particularly during the last few years, will, I believe, be sufficient to indicate how closely it bears upon problems in which the interests of the gas industry are far-reaching and vital.

RESEARCH WORK ON GAS APPLIANCES AT UNIVERSITY COLLEGE, LONDON.

By Prof. A. H. BARKER.

A general investigation of the efficiency of cooking appliances in common use was initiated some two years ago at the instance of the Department of Scientific and Industrial Research; and the matter was placed in the care of the writer. The object of these investigations, which at first had special reference to solid-fuel cooking ranges, was to afford some sort of guidance on matters of economy to the various housing committees, to enable them to select from a large number of fittings and appliances such as are suitable for adoption in housing schemes. At the instance of the British Commercial Gas Association, the authorities undertook later to extend these investigations to gas cooking appliances. The paper described in general terms the objects kept in view during the whole of the investigation, with special reference to gas appliances, so far as these can be considered separately. The principal objects were (1) to lay down some effective proposals for universal standards of efficiency, and (2) to develop general methods of test for all cooking appliances, so that comparisons between different appliances may be made on a much sounder basis than has been possible in the past. Tests are also being made with gas-fires.

Accompanying the paper giving a full account of the problems met with, and the means adopted for solving them, Prof. Barker submitted a shorter paper, in which he pointed out that he has designed a plant for testing these things which appears to be satisfactory; and it would be very gratifying if such a plant were placed in the hands of different members of the gas industry up and down the country, to secure their comments upon it. The fittings described in the paper can be bought ready made.

An extension of the work detailed by him which he has proposed is that the gas community shall lay down a country experimental station, which shall consist of a number, the more the better, of cottages occupied by intelligent working-class people, and suitably equipped with meters and other simple instruments. It is the working class which has the future of this country in its hands in these matters. If you can make it more profitable for a working-class community to adopt gas entirely—that is, instead of solid fuel—then you have solved the problem of making the use of gas universal.

In these experimental cottages, he suggests that there shall be a continuous series of trials and observations, under the most practical conditions, of appliances of all kinds, both gas and solid fuel, and electrical, for a series of purposes; and that there shall

be either one or two working-class women of suitable intelligence, attainments, and character, who shall spend a large part of their time in taking readings of meters in all the houses comprising the station, and notes of all kinds, from which it shall be possible to draw-up reports on the relative costs, labour involved, and other merits of these fittings for general use. The author hopes to be able to take a considerable part in this investigation.

Precisely the information we want from this country experimental research station is this: What is the total consumption, the total labour involved, and what are the total relative annual costs and the total advantages and disadvantages of such and such arrangements of gas, of solid-fuel, or electric appliances, in such and such a private house, arranged in a particular manner, as compared with other arrangements. At present there is no man on earth who can tell you with any precision for instance what is the relative cost of gas as against solid-fuel cookery, nor what is the relative cost and amount of labour involved between (say) an open coal-fire and a gas-fire in a private house, between a gas-heated and a coke-fired boiler and a kitchen-range boiler.

If such an installation is run for a very few years, it will be possible to give information to the public of a far more specific character than at the present day.

VOTES OF THANKS.

Mr. ROBERT WATSON (Doncaster Gas Department), in moving a vote of thanks to the lecturers, said their contributions that afternoon had been extremely valuable, and had shown that the gas industry, curious as it might appear, was trying to secure economy for consumers by every improvement in the appliances for gas consumption.

Mr. H. M. THORNTON, J.P., seconding the motion, which was carried, said he wished the lectures could have been delivered on the floor of the House of Commons.

Mr. RALPH HALKETT, in moving a vote of thanks to the speakers in the various discussions on the papers submitted, said that after the extravagance of the war, the nation had to set itself to reduce costs; and the papers had shown many ways in which economy could be effected. Undoubtedly a period of bad trade was before the country, and manufacturers could not do better than utilize the period by improvement of their plant to produce in the most economical manner.

The proposition was carried.

Mrs. M. A. CLOUDESLEY BRERETON moved a vote of thanks to the representatives of the Press who had attended the conference.

Mr. F. W. GOODENOUGH seconded the proposition.

Alderman HOBSON, in putting the motion to the meeting, said he had had a dose of American Press recently, and had come back from America convinced of the vast superiority of the British Press over that which the Americans had or deserved. He hoped to be more appreciative of the British Press than he had been hitherto.

VERTICAL RETORTS AT HAWICK.

Dempster-Toogood Installation.

There was a large gathering at the inauguration last Friday of the new carbonizing plant at the Hawick Gas-Works. The Hawick Gas Light Company have expended £35,000 on new vertical retorts, coal and coke handling plants, &c. The former is a continuous vertical retort installation on the "Dempster-Toogood" system. All arrangements for the inauguration were made by Mr. T. H. Armstrong (the Secretary and Treasurer) and Mr. J. D. Keillor (the Engineer and Manager).

The function was carried out very successfully. Mr. J. W. Broadhead (Managing-Director of Messrs. Robert Dempster & Sons, Ltd., of Elland), stated that this was the first installation to be put into operation in Scotland of the "Dempster-Toogood" retorts. It would produce half-a-million c.ft. of gas per 24 hours. He presented a gold key to Ex-Provost John Melrose, C.B.E. (the Chairman of the Gas Company), who then formally brought the plant into use by switching-on the electric power. Much satisfaction was expressed at the new installation; and a tour of inspection of the works was made by those present.

Lunch was served in the Tower Hotel, with Ex-Provost Melrose in the chair. Sheriff-Substitute M'Call proposed the toast of the Hawick Gas Light Company, and said that the Company had shown great enterprise. Mr. James Boyd Sime, a Director, proposed "The Contractors," and Mr. Broadhead, in reply, declared that to-day gas was undoubtedly more popular and in greater demand than it had ever been.

[Since the above short report was put in type, we have been favoured by Messrs. Robert Dempster and Sons with full particulars of the plant, opportunity of dealing with which will be taken in a later issue.—ED. "G. J."]

The programme for the opening meeting yesterday of the 102nd session of the Institution of Civil Engineers included an address by the President (Mr. John A. Brodie) and the presentation of awards made by the Council for papers dealt with during the past session.

The first visit of the session of the Scottish Junior Gas Association (Eastern District) is to be on Saturday, the 13th inst., to the Kelty and Kinross Gas-Works. After the inspection at Kelty, the members will be conveyed by motor to Kinross, to view the works of their President (Mr. D. Campbell). Subsequently, there will be tea with Mr. Tully at the Green Hotel.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Meeting at Leeds.

The One Hundred and Eighty-Eighth Quarterly Meeting of the Manchester District Institution of Gas Engineers took place on Friday afternoon last, at the Queen's Hotel, Leeds. Mr. E. H. HUDSON (the President) occupied the chair; and there was an attendance of some eighty members. Mr. Hudson was supported by Mr. G. M. Lawrence, J.P., the Chairman of the Normanton Gas Company.

LEEDS GAS DEPARTMENT WORKSHOPS.

Prior to the meeting, the members paid a visit of inspection to the Leeds Corporation Gas Department's workshops in Sovereign Street, where the scope and vastness of the work and the completeness of organization greatly impressed the members. Particular interest was taken in the method of registering and recording gas consumers and their appliances by exceptionally efficient utilization of the card-index system.

CONDOLENCES.

At the subsequent meeting, on the proposition of the President, votes of condolence were passed with the relatives of the late Mr. G. W. Houston, of Crewe, and the late Mr. Phillip Lancashire, of New Mills, Derbyshire.

NEW MEMBERS.

The following new members were elected: Messrs. Lewis Shaw, Rothwell; P. Wheeler, Leeds; and George G. Wilson, Whitwood Chemical Works, Normanton.

APOLOGIES FOR ABSENCE.

The SECRETARY (Mr. G. S. Frith) read a number of letters of apology for absence.

THE NEW OFFICERS.

The PRESIDENT announced the result of the ballot for officers for the ensuing year, as follows:

President.—Mr. Samuel Tagg, of Preston.
Senior Vice-President.—Mr. Harold Davis, of Chesterfield.
Junior Vice-President.—Mr. R. E. Gibson, of Liverpool.
Hon. Treasurer.—Mr. T. Banbury Ball, of Rochdale.
Hon. Secretary.—Mr. G. S. Frith, of Runcorn.
Additions to the Committee.—Mr. Thomas Brown, of Matlock; Mr. William Rogerson, of Middleton; Mr. C. S. Shapley, of Leeds.
Auditors.—Mr. Charles Potts, of Hyde; Mr. William Hill, of Stalybridge.

Mr. C. S. SHAPLEY (Leeds) read the following paper:

WORKSHOPS ORGANIZATION.

Looking round for a subject of real interest, I thought that a brief description of our workshops at Leeds, and the organization appertaining thereto, would prove of sufficient importance to produce a helpful discussion—more especially if the paper were preceded by a visit to the workshops.

IMPORTANCE OF EFFICIENT ORGANIZATION.

The first thing it is necessary to observe is the importance of adequate and efficient organization. This cannot be over-emphasized. The subject is far-reaching, embracing most important matters—such as conservation of man-power and material. It also conserves the profits that have been made in the retort-house, preventing their being dissipated through lack of control. Inadequate organization leads to waste of time, labour, and material, and entails heavy labour costs. The opportunity for waste will be apparent at once, when I tell that in the workshops alone we are paying in wages every week approximately £900. Inattention to detail culminates in slipshod work, and makes all the difference between a good and a bad balance-sheet. It is certain that, with the ever-increasing progress of our industry, more attention will be paid by all gas undertakings to workshop organization. This will enable the management to see that the gas passing through the meter is correctly measured. It is not a commercial proposition to make gas on the works, and trust to providence when it comes to measuring it for sale.

Efficient organization may be defined as a wise and economical adaption of means to an end, and should be so arranged as to exclude waste, whether of time, material, or transport. The general scheme of things should be so devised as to obtain the maximum of effect at the minimum of cost. I do not for one moment pretend that we have yet attained perfection in Leeds. Feeling that there is always something better than we have yet reached, we are not simply marking time, but steadily moving to still greater efficiency.

THE WORKSHOPS.

Speaking generally, the work has considerably outgrown the capacity of the workshops. Limitation of floor-space has resulted in the separation of our despatch department from the workshops by nearly a mile, which in itself is a great handicap. I therefore wish to take local arrangements simply as illustrations of what would otherwise be a rather abstract method of dealing with the subject.

The workshops cover about 2944 sq. yds., and find employment for about 250 men. The shops are all on the ground floor, greatly facilitating the handling of materials and apparatus. There is no need for any hoist, or for moving heavy articles from one storey to another. Work begun in one part of the shop is easily passed on for continuation and completion in its successive stages, with a minimum of manual labour, and consequently of working costs. The importance of this item will be evident when I say that in a normal year we deal with approximately 7183 meters, 1576 cookers, 1342 fires and radiators, and 1000 lamps, besides other work of a more general character.

TESTING RETURNED METERS.

After describing the card system by which meters are dealt with from the time of their purchase, Mr. Shapley said that all meters brought into the workshops for repair are first taken to the cleansing tanks to be washed, and then to the testing-room. Here the meter is put through a registration test, in order to secure the necessary information as to its condition, and to determine if the meter is in a fit condition to be re-issued without repair. The tests are all made at a pressure of 20-10ths; and the procedure for dry meters is as follows: The meter is tested at its rated capacity per hour, and the quantity to be put through is determined by one revolution of the testing-dial. If at this speed the meter is found to be correct, another test is put through at the speed of half its rated capacity; and, if still correct, a further test at quarter-speed, and a final test at the rate of 5 c.ft. per hour. Providing that the meter passes all the tests, a leakage test at 50-10ths pressure is applied; and, if sound, the meter is then re-painted and booked into stock as a usable meter. A meter is rejected when it fails at any particular test; and no further tests are proceeded with. A label is attached, stating the result of the test, and why rejected, as a guidance for the repairer.

METER REPAIRS.

With meters up to the size of 10-light, a repairer is given six meters as a job, together with a time-sheet stating the maker's name and numbers. The meter repairer then proceeds to open all six meters; the slip that was attached in the test-room giving him some guidance as to the condition of the diaphragms. Repairs are, of course, restricted to accord with true economy. For instance, if a 3-light dry meter required a new case and new diaphragms, it would not pay to repair it at all. It would therefore be condemned, and sent to the salvage shop. If, however, the case showed promise of a few years' more life, and the diaphragms were bad, these would be replaced. Further, if a 3-light automatic meter came in with the attachment damaged, no attachment repair would be attempted. The damaged attachment would be taken out, a new side put on the meter, and it would then finish its life as an ordinary meter. So far as larger sized meters are concerned, if cases and diaphragms are in bad condition, but the valve plate and division plate are good, a new case and diaphragms are fitted.

THE DIAPHRAGM.

Great care must be exercised in seeing that the diaphragms are maintained in the very highest state of efficiency. Faulty diaphragms are likely to lead to such losses as would absolutely nullify the best working and administration in every other direction. This led me to instal a diaphragm room. Heretofore we were dependent upon outside sources; and consequently we never knew the actual condition of the diaphragms we received. In the diaphragm room the whole of the process of manufacture, from the raw material to the finished article, is carried out. It is matter for congratulation, and speaks well for the painstaking character of the workmanship, that the number of diaphragms spoilt in stitching is remarkably small.

RE-TEST OF METERS.

When the meter has been repaired, it is forwarded to the test-room, where it is subject to a 5-in. pressure test for soundness with a King's gauge. If no leakage is found, the tester proceeds with his test in accordance with the Board of Trade requirements, at ½-in. pressure, and when he has brought the meter registration within the range of error permitted, the meter is sent back to the repairer for the top to be soldered on.

WET METERS.

As regards wet meters, we have only a small percentage of these in Leeds. The expenditure on them is severely restricted. If the iron case is badly corroded, the whole meter is scrapped, and sent to the salvage stores. Here the drum is examined; and if found to be in a sound condition, it is put into stock, and may be used for another meter found to be faulty in the opposite direction—viz., where the case is sound and the drum imperfect. No new drums or cases are purchased for wet-meter repairs.

PAINTING.

On the completion of repairs and testing, the meter goes to the paint-shop. Here the painting of all appliances is done by means of a paint-spraying plant, consisting of a water-cooled air compressor capable of delivering 10 c.ft. of air per minute, a main air-receiving tank, an exhaust fan for exhausting paint-laden atmosphere, capable of removing 8500 c.ft. per minute, a 3 ft. 3 in. diameter turntable for large meters, cookers, and radiators, a 12-in. diameter turntable for small meters and gas-fires, and a double spraying machine, fitted with two paint-pots and two sprayers, enabling two men to work together. This plant has been fixed about eighteen months, and is worked by one man with occasional assistance. During September (which, owing to holidays, is one of the lightest months) no less than 1000 meters were painted by this spraying plant, with a considerable saving in labour costs and paint over the old brush method. In addition to this, a much better finish is obtained.

GAS-COOKER REPAIRS.

Gas-cookers are received in various conditions—some only soiled, others filthy. For the last-mentioned four cast-iron tanks are fitted in the stove-shop, two containing hot water, and the others a strong solution of caustic soda. Above the tanks a light rail is fixed to facilitate the handling of apparatus. The tanks are heated in summer by gas, and in the winter by a steam-pipe from the boiler serving the works. The dirty cooker is elevated by blocks and chains, and run over a tank containing caustic soda, into which it is lowered. After remaining in pickle for a time, it is drawn out and run forward into the next tank, which contains hot water, where it is swilled, and afterwards allowed to dry. The cooker is then taken to pieces, re-built, and the linings re-packed with new slag wool. The next step is to the paint-shop, where it is sprayed with an air-drying black, with the exception of the parts which come into contact with the heat. These are dipped in vats, and allowed to drip, before stoving. After being re-blacked, the burners are fitted-in and tested. Our practice is to fit all cookers with both gas and air adjusters. One man is responsible for this, and for testing all cookers before they leave the works. Cookers only soiled are washed-out with caustic solution and hot water, and are not taken to pieces. After this, they follow the same process as the others.

ELECTRO-PLATING PLANT.

In Leeds, we receive back into our shops a large number of cooker-tins, soiled, but capable of a further number of years' life. Owing to the high price of these tins, I decided to instal a plant for re-tinning them, and was fortunate enough to pick-up a good second-hand plant from a munition works. It consists of a 5-volt dynamo, resistance board, acid bath, scouring tanks, drying tanks, and two plating vats. Our practice is to accumulate a number of pans and grids, and to run the plant until all are re-tinned. In the winter time, we heat the solution by steam from the heating apparatus. This probably lets-down the solution somewhat, but it is cheaper than using gas. In the summer, of course, gas is used. The cost of re-tinning, after making allowance for interest on and depreciation of plant, works out at less than one-quarter the price of new tins.

GAS-FIRE AND RADIATOR REPAIRS.

It is our endeavour to renovate second-hand gas-fires, and make them equal to new. We realize that this is an appliance which is usually fixed in the best rooms, and consequently must have a good appearance. Unfortunately, there are consumers who will attempt to touch up gas-fires themselves—usually applying an air-drying black—and as a result the ironwork has an uneven surface. In such cases, we take out the fire-brick and burner, and place the frame in the caustic solution tank. This removes the old coating; and after a wash-down the frame is sent into the paint-shop. In the meantime, the brick is washed with a weak mixture of Tamac and water, which gives it a new appearance. In the case of a split brick, the pieces are also joined with Tamac. When the frame has been sprayed with a stoving black and stoved, it is sent back into the repairing shop, the brick and burner re-fitted, tested, and then forwarded to the stores. When a gas-fire is only slightly soiled, it is repainted, the brick cleaned, the burner tested, and the fire sent into the stores.

In dealing with repairs to radiators, our process is to remove the gauges and valves, clean the column with a wire brush, and then forward to the paint-shop. Here the radiator loops are beautifully enamelled in a stove which was built by our own workpeople, and is capable of holding ten radiators at one time. This stove was erected in order to be able to turn out second-hand gas-fires, radiators, and cookers equal to new. In order to bring the cost of working the stove down to the absolute minimum, the gas used in testing automatic meter attachments in the test-room is conveyed across the shop so as to heat the stove. Arrangements are made for a duplicate supply, so that other gas can be turned on should the supply from the test-room fail. We find that 75 p.ct. of the gas used in heating the stove is obtained from the test-room. After being stoved, the radiator is fitted with the gauges and valve, new gauge-glass washers, and valve discs. Water is then put in; and it is tested with gas, in order to ascertain that the joints are sound. This process also applies to gas-heated steam radiators. Hot-air radiators have the tubes cleaned out and re-blacked. Any broken glasses are renewed; the burners are re-fitted and tested; and the radiator made once again ready for use.

REPAIRS TO STREET LANTERNS.

This branch of work has only recently come into our department. Previously it was carried out in another building, under a separate Committee. Lanterns badly damaged are scrapped; the good parts being taken out and used up in repairing those only slightly damaged. After repairing and painting, the lanterns are hung-up unglazed until wanted; only a small stock being kept glazed for replacement. This section at the present time is busily engaged. Leeds, in common with other towns, during the war was only partially lighted. Owing to shortage of store room, it was impossible to bring in all the unlighted lanterns; and a large number of these have been wilfully and badly broken. All the

unlighted lanterns are being brought into the shop for examination and repair.

SALVAGE.

All material and appliances scrapped are sent to the salvage shop. Here everything is broken-down, and parts likely to come in useful for repairs are dismantled and sent into the stores. The various metals are sorted out, and prepared for sale, with the exception of the wet-meter drums. These are allowed to accumulate for a time, and are eventually melted down into ingots, and sent into the stores to be used for solder making. The tinsmith's shop is swept twice daily, and the sweepings sent to the salvage department. These are eventually melted down; and the solder which has been dropped on the floor in the process of opening-up meters and other work, is thereby recovered.

BRASS FINISHING AND SHEET-METAL WORK.

Time will not permit me to more than mention the work of our brass finishers, who carry out a variety of tasks, ranging from the repair of main-cocks to those of motor-car parts, or our sheet-metal workers, who are engaged in the routine business of such workshops, in addition to a great many other jobs for the works and district.

THE PERSONAL FACTOR.

A short account of the clerical side of the business was then given by the author, who explained the very complete card system which has been adapted to the needs of the case. The author then concluded: I have endeavoured to take you through the whole of our working system. Now I would like to impress upon you what is, in my opinion, the greatest asset to successful management and organization—namely, the personal factor. How can this personal factor best be secured? In the first place, by getting into personal touch, and being always accessible through the proper channels at the right time and place, with a fixed determination to mete out fair treatment and consideration. My experience is that, thus treated, the great majority of workmen respond very well, and enter into a spirit of co-operation. In dealing with the staff, this same personal factor is still more important, as the staff are almost entirely responsible for the good working and carrying out of these ideals. The head of the department must be the right man in the right place. He should, through his administration, be able to feel that he is a trusted and responsible person with an important position in life to fill, with always the opportunity of showing his individuality. Environment, too, is a great factor. If the offices and workshops are well ordered, bright, and reasonably comfortable, this order and cheerfulness will be reflected in the employees. Working on these lines, you can confidently expect successful results.

DISCUSSION.

The PRESIDENT (Mr. E. H. Hudson) observed that the meeting had listened to a highly interesting paper. To many of the members, the Leeds workshops had shown themselves to be quite novel in their organization and in the phases of work they had to do. To one in charge of an undertaking as his (the President's) own, it struck him as being impossible to attain to such perfection as there was in the Leeds workshops. The magnitude of the work of the Leeds Gas Department enabled Mr. Shapley to organize such a system of workshops, to the great benefit of his department, which was perhaps beyond the possibilities of many works. At the same time, the inspection suggested a thought as to whether, by combination of some kind, many of the smaller works might not achieve some similar success. This, perhaps, was a thought which the members might take away from the meeting and develop at their leisure. The points which had struck his attention very much, both in the workshops and in the paper, were economy and salvage. They all knew that salvage was profit; and when they came to consider the amount of salvage at most works, they realized what a tremendous amount of waste there must be at many places. Beyond the general work of repairs, &c., the most profitable item which had impressed itself on his mind was that of the retinning of utensils for the cooking appliances. Mr. Shapley thought this was done at a tithe of the cost of new tins, yet in the works the retinned utensils appeared to be perfectly new.

Mr. H. E. COPP (Hull) said he was afraid they in the gas profession were rather liable to work in what one might almost call a vicious circle of limited ideas. A short time ago his undertaking had a somewhat similar, though much less pretentious, workshop at Hull; but it was destroyed by fire, and he had now the job of creating something new. The keynote of the Leeds establishment seemed to be its efficiency. He had himself once had a nickname, of which he was rather proud than otherwise. He was called "Old Efficiency." He did not object to such a name. He did like efficiency; and he liked to scrap everything that did not fulfil its purpose properly. Mr. Shapley, in his paper, had dwelt very properly on the personal element. There was no doubt that workmen would respond to the keynote of efficiency where they were in proper and happy surroundings.

Mr. S. MEUNIER (Stockport) said that at his own undertaking he worked very much on a similar system to that adopted by Mr. Shapley. Some years ago he had had the opportunity of starting a new works; and he took advantage of this to lay-out what he thought was a proper method of dealing with stoves, meters, &c. They had similar appliances and workings to those of Leeds, even to the re-tinning process; and they certainly found this process of great benefit. They did, however, experience one or two points of difficulty, even under such a system. One was in regard to the collection and delivery of appliances. They did it by motor van, as in the case of Leeds; but he wondered had Mr. Shapley thought of the fact that, however careful they might be in arranging economies, the human element stepped in, and they found the vans sometimes coming back very lightly loaded. He was trying to work-out a system now by which they would collect in various districts, bring the appliances to one district centre, and then send them on to the works. As to checking fitters' sheets, had Mr. Shapley considered the human element in the matter of the certification of the actual time the man did occupy on the consumer's premises? On the cards at Stockport, they had an additional place for the signature of the consumer, certifying that the times put down by the man in respect of arriving and leaving were correct. He asked the proportions of the various oils and black lead used by Mr. Shapley. He was glad to learn that Mr. Shapley had solved the salvage difficulty, which they in Stockport had not yet done. Undoubtedly, the amount of waste which went on in a distribution department was enormous; and unless they had a very clear-cut policy to enable them to cover this—had men responsible for examining everything that came in, and putting into scrap all that was not repairable except at very heavy cost—then they must lose money. He believed some of them lost more money than they were aware of. At least 70 p.ct. of the material which came in was re-usable with very slight attention. The remainder should be turned into money.

Mr. R. E. GIBSON (Liverpool) said at his undertaking they repaired and also made their ordinary meters. He had been greatly struck with the magnitude of the work in this and other departments at the Leeds workshops. Though his undertaking made all their own ordinary meters, and repaired a large proportion of the others, they did not employ the number of men that Mr. Shapley did. He could only attribute this to the fact that at Liverpool they used wet meters for the ordinary consumers, whereas Mr. Shapley had "gone dry." [Laughter.] In a reference to automatic meters, the paper stated that, when the attachment became damaged, the meter was turned into an ordinary meter. He did not quite see why this should be done, if there was not very much wrong with the attachment. In regard to the diaphragms, in Liverpool they purchased theirs; and he fully believed that Mr. Shapley's method of having them made by the department was the better. He noticed that Mr. Shapley had fixed cookers with gas and air adapters. He wished they had air adapters in Liverpool. Their quality varied a good deal, owing to the large percentage of water gas which they had to deliver; and they had trouble with their cookers. They were carrying out re-tinning on exactly the same lines as Mr. Shapley, and with similar plant, and found it a very great saving. In regard to the testing of meters, he noticed Mr. Shapley said he had them cleaned before testing. It rather seemed to him that it would be preferable to leave them uncleaned. There was often a disputed account; and it was essential to test the meter, as far as possible, under the conditions in which it had been working.

Mr. H. E. BLOOR (York) observed that, with regard to workmen, he thought any attempt to check times, &c., almost put men on their metal to "do" the management if and when the chance occurred. It was possible to go too far in organizing on that side; and they might do better by getting the goodwill of the men not to waste their time or adopt "ca' canny" methods. The magnitude of the Leeds workshops was no less astonishing than the appearance of orderly working everywhere. On the matter of air and gas adjusters, he well remembered his own strong opposition to the idea some years ago; but the war had altered a good many ideas. As to the testing of meters, he had found it very valuable, on disputed accounts, to test the meters *in situ*.

Mr. HAROLD DAVIES (Chesterfield) said he took it the workshops in Leeds Mr. Shapley had established for the three prime purposes of economy, efficiency, and accuracy. He, it seemed, was spending £900 per week in wages in that place alone, and was dealing with 11,000 pieces of apparatus a year—an average cost of about £4 per piece. This might seem rather a high figure; but he believed they would all be satisfied that Mr. Shapley had done the best possible in the circumstances. They saw in the workshops a real example of efficiency, economy, and accuracy. It might be desirable, however, if Mr. Shapley would amplify the particulars of the various things the workshops dealt with, besides those which had been particularly mentioned in the paper. It would be seen really that the cost was materially reduced by these other things.

Mr. H. R. S. WILLIAMS (Altrincham) said he had been for some time considering the subject of wet meters. He had formerly been connected with an undertaking which used only wet meters, where their unaccounted-for gas never exceeded 2½ p.ct. The price of the wet meter new, as compared with the dry, was considerably higher; but when they considered that they could work a wet meter up to thirty years with only trifling repairs, the question occurred to him as to whether it was not about time for wet meters to come into use again. Dry meters needed a great deal of attention to make sure they were registering correctly. Had Mr. Shapley any figures which had induced him to oust wet meters in favour of dry?

Mr. F. H. ROBINSON (Harrogate) asked if Mr. Shapley had any great difficulty disposing of the spent liquor from the caustic tanks.

Mr. W. D. HELPS (Leeds) begged permission, as one connected with a firm of apparatus makers rather than gas makers, to say a few words in appreciation of the paper and of the visit to the workshops. This was the first meeting of the Manchester Institution at which he had been present for many years. For thirty years he had watched the management of the Leeds Corporation Gas Department; and he believed to-day they could safely say it had been upward and onward throughout those years. They had that day seen in the workshops advancements second to none. He entirely agreed with Mr. Bloor that consumers were far more satisfied when meters were tested in their own houses. In regard to wet and dry meters, he had been a wet-meter man all his life; and he was yet. Four or five years ago his firm had decided to make no more wet meters. He believed that if Mr. Williams went in for the re-adoption of wet meters, he would find that anything up to 50 p.ct. of his index-takers would be applying for jobs elsewhere. It was not the fault of the wet meter that it had been discarded, but was due to the complaints of the index-takers. Workmen to-day wanted as much money as possible for their work, but not so much work as possible for their money. The wet meter gave them some little extra work as against the dry meter; and if members inquired of consumers they would find that the index-takers had been the advocates of the dry meter for years past. Though, as he had said,

he was himself favourable to wet meters, he did not think the industry would ever get them in again.

Mr. SHAPLEY, in replying to the discussion, said Mr. Meunier had raised a very important point in the matter of transport. It would be impossible to touch fully on this and some other matters in the time at disposal. At Leeds they had a very full transport service. They had five motor vans of varying capacity in connection with the workshop. They had a special transport clerk who arranged the loads to take-up as far as possible any one district. In a department such as delivery on the distribution side, no doubt there were unavoidable items of waste. The cost of taking a cooker-tin to a house, if this was the only item in the district, would, of course, run out rather high; but as far as possible, and allowing for the human element mentioned, the Leeds transport side was arranged with a view to the greatest economy. In respect of the checking of fitters' sheets, he was inclined to agree with Mr. Bloor. At Leeds, however, they did have some check. They selected a proportion of sheets each week, and had them checked by the foreman. This was as far as they went at present.

Mr. MEUNIER said the checking was a point which cut both ways. There were certain jobs done by the gas department men which the consumer would have to pay for. If the consumer signed the time-sheet, there could be no cavilling about the charge.

Mr. SHAPLEY agreed that there was something in Mr. Meunier's idea; but even then the certificate might be signed merely by a servant at the house, and might be quite unreliable. As regarded meters, it was true that in Leeds they were all dry at present. Their leakage account for last year was only 5 p.ct., on a mileage of something like 1200. He did not think this was bad. They were hopeful of reducing even this by care in the diaphragm making room. Mr. Gibson mentioned the fact that meters were cleaned before being tested. Chiefly he was speaking of exterior cleaning. The men who did this work were a superior class of men; and they did not like to have to handle meters which were in a filthy condition. The outside was scrubbed, so that neither the men nor the test-room got into a mess. In answer to Mr. Davies' question as to the cost of working the shops, the paper, of course, had not covered all the ground. The work included street lighting complaints, fixing of incandescent burners and outside appliances, and other features, besides the things specially mentioned in the paper. They found their expenses were slightly under what they could get the meters repaired for by the manufacturers; and, with all due respect to anybody who might be present who was connected with makers and repairers, he believed they got rather better work. In regard to disputed accounts, there was much to be said for testing the meters *in situ*; but Mr. Bloor would be aware, of course, that disputed meters must be tested by the official inspector. Examination *in situ* could only be done as a preliminary.

Mr. BLOOR (interposing) said his department tested *in situ*, made a report, and informed the customer that if he or she desired the meter tested by the official tester, and the Company was found to be wrong, they would pay the cost of the official testing. In practically no case had they had to send to the official tester. Perhaps Mr. Shapley had rather misunderstood him. When he said disputed meters, he did not mean cases of going to the extreme length. He had found it most useful and illuminating to let two or three men go round street by street and test meters now and again.

Mr. SHAPLEY said he quite agreed with Mr. Bloor, and would certainly consider his suggestion. Mr. Williams had mentioned the question of wet and dry meters; but he thought this had practically been covered in the discussion and the reply. He would like to pay testimony to the very excellent staff he had at Leeds. Without such a staff, they could not carry on as they were doing. The staff had backed him up on every possible occasion.

VOTE OF THANKS TO THE LEEDS CORPORATION.

The PRESIDENT, in proposing a vote of thanks to Mr. Shapley and to the Leeds Gas Committee and the staff for the way in which they had provided for the welfare of the members that day, said the Committee had generously thrown open the workshops to inspection, and Mr. Shapley had given his experience of the working of these shops. They would all go home and dwell on the matters presented to the meeting, and would profit thereby. When he had suggested to Mr. Shapley that he would like to invite the Manchester Institution to come to Leeds, he had most readily acquiesced to do all he could for the benefit of the members. He (Mr. Hudson) was only sorry that he had been unable to invite the Institution to Normanton; but while Normanton was quite a good mining town, it was not a good place to entertain a body of visitors.

Mr. BLOOR seconded the vote of thanks; and it was carried unanimously.

Mr. SHAPLEY, in replying on behalf of the Gas Committee as well as on his own behalf, expressed the regret of the Chairman of the Committee at absence, owing to his being in London. The other members of the Committee were all very busily engaged in the last days' activities in connection with this year's municipal elections.

Mr. WALTER HOLE replied on behalf of the staff (in the absence of Mr. Went, the Manager of the workshops), and said it had been a real delight to have the members of the Manchester Institution in Leeds.

THE GUESTS OF THE NORMANTON GAS COMPANY.

The members afterwards had tea at the Queen's Hotel, as the guests of the Chairman (Mr. G. M. Lawrence, J.P.) and Directors of the Normanton Gas Company.

A fire which broke out in the screening-room and coke-house of the Prospect Street plant of the Citizens' Gas Company, Indianapolis, destroyed large quantities of coke, causing a loss estimated at $50,000. The fire was discovered at the top of the coke-house, a three-storey corrugated iron structure. The origin of the fire it is believed was a spark from electric wires.

MIDLAND ASSOCIATION OF GAS ENGINEERS.

Autumn Meeting.

The Autumn General Meeting of the Association was held at the Grand Hotel, Birmingham, on Thursday last. The chair was taken by Mr. JAMES R. DUFF, of Banbury (the President); and there was a representative attendance.

The following were elected members: Mr. C. F. Tooby, of Coventry, and Mr. C. F. Rendle, of Redditch.

The PRESIDENT intimated that no names had been submitted for the various positions that would fall vacant on the Committee; and it was therefore recommended that at the meeting early in the new year the following appointments should be made:

President: Mr. James Paterson, of Cheltenham.
Vice-President: Mr. W. M. Valon, of Stafford.
Committee: Messrs. W. E. Caton, of Oxford; P. N. Langford, of Coventry; and W. G. S. Cranmer, of Willenhall.
Auditors: Mr. F. C. Briggs, of Dudley, and Mr. F. Key, of Lichfield.
Hon. Secretary: Mr. T. Thornton, of Rowley Regis.
Hon. Treasurer: Mr. W. R. Cooper, of Banbury.

Authority to submit these names was given, on the motion of Mr. W. S. MORLAND, of Gloucester, seconded by Mr. H. HADDOCK, of Atherstone.

The PRESIDENT said the members would probably have noticed that Mr. Thornton had consented to take over the secretarial duties of the Association. He was sorry to say that Mr. Cranmer had found it necessary to resign, which they regretted very much indeed. The Association was greatly obliged to Mr. Cranmer for the way in which he had carried on the office of Secretary for the past seven years. He (the President) had great pleasure in proposing that a very hearty vote of thanks be accorded him for his valuable work on behalf of the Association.

Mr. PATERSON, in seconding, said those of them who had had the duty placed upon them of acting as Secretaries of such Associations knew that a vast amount of work was entailed by these posts, and also that there must be brought into the task more than work itself. Mr. Cranmer had shown all the other qualities which were wanted in addition to the actual work. His courtesy to the members, and his care on their behalf, together with the tactful way he made arrangements for meetings, especially during the war, called for their sincere appreciation.

The vote was enthusiastically carried.

Mr. CRANMER, in acknowledgment, said he was not giving up the secretaryship with any amount of pleasure, because the work had always been interesting to him, and he knew very well that he should miss it. At the same time, he felt that he was not now able to do the work full justice; and he considered that it was about time that someone else took on the work. He did not think a Secretary should remain in office too long, as it was desirable that fresh blood and new ideas should be introduced.

The PRESIDENT informed the meeting that the fund on behalf of Mr. R. Thomas, of Droitwich, amounted to £80 16s., including the ten guineas which the Committee recommended from the Association.

The donation was readily confirmed.

The SECRETARY stated that there were 54 yearly subscriptions outstanding; and the President urged members to pay more promptly, as otherwise it entailed a good deal of extra work by the Secretary.

INDUSTRIAL FURNACES.

A paper, illustrated by lantern slides, was read by Dr. C. M. Walter, of Birmingham, the object of which was to describe the principles on which the various forms of muffle and oven furnaces operate; and, secondly, to compare the relative merits of each particular type of furnace for a given process, and incidentally to outline the direction in which developments are likely to take place in the future, with a view to increasing the working efficiencies at present obtainable.

It is now realized that in many industrial operations where the heat-treatment work has to be carried out, a considerable saving of fuel might be effected by the employment of some of the more modern types of furnace plant which are now available, and which undoubtedly are still capable of further improvement.

Having reviewed the principles on which depend the transfer of heat from the fuel to the working chamber of a furnace, the main organs which in combination form the complete furnace were enumerated by the author, and their functions described. From this he went on to refer to the operation of direct-fired furnaces, and gas-furnaces with separate or "built-in" producers employing recuperators. Thereafter he dealt with the subject of

FURNACE EFFICIENCIES.

The efficiency of a furnace has for a long time been a much vexed question; and even to-day it would appear that a satisfactory basis on which the performances of different makes of furnaces can be compared has yet to be formulated. When speaking of efficiencies, one usually is interested in the efficiency of the operation carried out in the furnace, which will be the ratio of the heat usefully employed in the heating of the work to the total heat supplied. However satisfactory this may appear from a practical point of view, it does not provide a basis on which the efficiency of the furnace from the point of view of total heat

utilized in the working chamber can be computed, as it will easily be understood that the working efficiency will depend both on the nature of the load and its character and distribution—in other words, on the nature of the load with regard to its conductivity for heat.

One basis which has been suggested, and which would appear perfectly rational, is the efficiency obtainable on a basis of the total heat utilized (irrespective of whether it is employed for heating work or for overcoming the conduction and radiation losses in the working chamber) compared with the total heat supplied by the combustion of the fuel. This forms a basis which is independent of the nature of load, and, for a given type of furnace, has many advantages, as it affords a true representation of the percentage of heat which is imparted to everything within the furnace-chamber, including the heat radiator, or conducted from the brickwork of the chamber itself, and can be estimated from a knowledge of the calorific value of the fuel and the temperature and composition of the waste gases at the outlet-flues from the heating chamber.

Where the efficiency is based on the heat expended in doing useful work, I would wish to point out that it is absolutely essential, in computing the total heat given-up to the work, that the total heat of the particular material over the working temperatures employed be used, instead of the product of the specific heat at ordinary temperatures, and the rise in temperature, as the latter estimation does not take into account the increase in the specific heat of metals at the higher temperatures, and is likely to lead to very serious errors.

Furnaces in which Town Gas or other High-Grade Gas is Employed.

Furnaces coming under this heading may practically speaking be divided into two classes as follows:

(1) Furnaces required for annealing, reheating, and other processes, where only intermittent heating for short periods is necessary; the period of heating ranging from a few hours up to a full working day.

(2) Furnaces where the heating process is a continuous one, occupying long periods, and involving continuous running of the furnace day and night, as in the case of such work as the annealing of strip metal, billet metal, and other similar processes.

In the case of furnaces coming under Class 1, where it is necessary that the design should be such that the required temperatures can be quickly and readily obtained, and where usually on this account the brickwork is reduced to a minimum, these are fired either direct or with counter-current regeneration of secondary air. In many cases a small direct-fired furnace in which the secondary air is pre-heated by passing through flues arranged in the bed of the furnace, is found to give very satisfactory results, and at the same time does not involve a large capital outlay; and though such a system is by no means the most economical from the point of view of fuel economy, nevertheless, from a consideration of first cost, simplicity of manipulation, ease of control, and speed of heating-up to any required temperature to (say) 900° C., it is found to favourably compete with many other types of furnaces in which regenerative systems are employed.

In operations where the period of heating is extended over several hours, and also where the furnaces employed are larger in dimensions, the direct-fired furnace, with a counter-current system of recuperative setting, may be employed. With such a design, the secondary air is pre-heated by the waste gases, which, of course, leads to a considerable increase in fuel efficiency, but at the same time entails increased capital outlay.

Further, in furnaces of this type, the period required for heating-up to the requisite temperature is much longer than in the case of the direct-fired furnace referred to above, owing to the increased mass of brickwork which is necessary in the construction of the recuperative setting. It will thus be seen that the most suitable furnace for a given operation must depend, in the first place, on the working temperature; secondly, on the time during which the operation lasts; and, finally, on the size of the furnace which is required. As regards the fuel consumption in the case of the direct-fired furnace in which the pre-heating of the air is not carried out by waste gases, it is found that for each square foot of interior heating surface of the oven employed, about 11,000 B.Th.U. per hour are required for heating-up to a temperature of 800° C. in one hour. The consumption for maintaining this temperature under load approximates to 4500 B.Th.U. per hour per square foot of heating surface.

Where a furnace fitted with recuperators is employed, in which the secondary air used for combustion is pre-heated by means of waste gases, a saving of fuel of as much as 35 to 40 p.ct. can be effected in the complete operation of heating-up the load and maintaining at some pre-determined temperature over that used in the case of a direct-fired furnace.

When dealing with furnaces coming under Class 2, where the operation of heating is prolonged, and the process is not intermittent in its nature, it becomes at once imperative to use a furnace designed primarily for high fuel efficiencies. Such a furnace would be used, as previously mentioned, for the annealing of billet and strip metal and similar classes of work, where temperatures up to (say) 800° C. are required, and also for the firing of ceramic ware, enamels, and other high-temperature work, where temperatures perhaps up to 2000° C. are necessary. In such designs, the counter-current system of pre-heating the air by means of waste gases is a *sine quâ non*, if high efficiencies are to be obtained; and in cases where the higher temperatures are necessary, it becomes essential to pre-heat the air to the maximum temperature, as it will be understood that only by this means is it possible to obtain temperatures of this nature.

The regenerative work must, therefore, be massively constructed, and designed for the greatest possible heat capacity; and, if necessary, the pre-heating might be done in a separate recuperator, through which the waste gases pass on leaving the hearth of the furnace, prior to their entry into the waste-gas flues. Such recuperators would be used in pairs, and alternately, in the first place, for extracting the heat from the waste gases, and, secondly, for giving-up the heat thus recuperated to the air used for the combustion of the gas.

In this connection, it is interesting to note that during a test recently carried out by the author on a furnace of this type, 54 in. long by 32 in. wide by 24 in. high (interior), made by the Davis Gas-Furnace Company, of Luton, the following figures were obtained:

Nature of load	= Steel billets
Weight of load	= 880 lbs.
Working temperature	= 825° C.
Heating-up period	= 1 hr. 33 min.
Total gas used for heating-up load	= 1150 c.ft.
Maintaining consumption 300 c.ft. per hour	
Gas consumption per hour per pound of load maintained at 825° C.	= 0·35 c.ft.

These figures are a considerable improvement on those which obtained in the case of the direct-fired furnace. It is further interesting to note that, with this furnace, temperatures over 2000° C. have been obtained; and a figure of efficiency constituting the ratio of: $\frac{\text{B.Th.U. employed in doing useful work}}{\text{Total B.Th.U. supplied.}}$ of nearly 40 p.ct. was obtained. This figure was carefully checked by determining calorimetrically the total heat of the particular metal heated over the working range of temperature employed. It should be here noted that the figure of efficiency given is not the furnace efficiency referred to earlier, but a figure of working efficiency for one particular condition of loading.

It will thus be seen that in this direction lies an enormous field of development of the furnace fired by town gas; and if it were possible to obtain gas of 500 B.Th.U. per cubic foot from the town main at a figure approaching 1s. per 1000 c.ft., even in the case of furnaces of large dimensions there would be no justification for the employment of producer plant, owing to the enormous advantages to be gained by the use of such a fuel, and the reduction in working costs due to the handling of fuel, firing, and cartage of ashes, that obtains in other systems—to say nothing of the huge advantages to be gained due to the simplicity of operation, ease of temperature control, and cleanliness of the work.

Tubular Furnaces.

Another application for town gas for heat-treatment work is the firing of tubular furnaces. For furnaces of this type of moderate size, it would appear that this form of firing is likely to be one of the most economical for the purpose, when used with recuperative and regenerative settings. The heating of a fire-clay tubular setting uniformly for a considerable length with a series of gas-burners, has in many instances been an extremely difficult proposition; but the employment of a large number of separate combustion chambers, each capable of independent control, and provided with proper arrangements for pre-heating the air, would seem to a great extent to overcome the difficulties which have hitherto presented themselves in this connection.

It will be remembered that, when heating a tubular setting, due allowance must be made for what may be called "cold-end effect," which may be explained as the cooling-down of the extremities, due to increased radiation losses in these zones. But it will be easily understood that, if the furnace is designed with a large number of combustion chambers, each capable of independent control, these heating losses may be compensated for to a very considerable extent, and in this way a uniform temperature over a long length of tube heated can be obtained.

Mention was then made by Dr. Waller of the electrically heated furnace, which he briefly described.

Selection of Furnaces and Probable Lines of Development.

In selecting a type of furnace which is to be the most efficient for a given operation, the deciding factors must be: First, the nature of the work; secondly, working temperature or range of working temperatures; and, thirdly, facilities for getting fuel.

It may here be mentioned that if, for example, the working temperature is below 500° C., there will be little to recommend the recuperator over the direct-fired furnace; while where temperatures of 1000° C. or more are required, there is no doubt some form of recuperative furnace will lead to an enormous saving in fuel. If the working temperatures are of the nature of 1500° to 2000° C., it then becomes a question as to whether double or triple recuperation should be employed. But such matters as this will have to be decided by very careful consideration of the process from all points.

Conclusion.

In conclusion, the author referred to the lines in which developments are likely to take place. In the case of the direct-fired

furnace, there is little doubt that any improvements in fuel efficiencies will only be obtained in the direction of more complete combustion, the least possible excess of air, and, further, by the employment of pre-heating chambers, steam-boilers, or other organs of recuperation, all of which make possible the increase of fuel efficiency in a furnace of this type.

With regard to gas-furnaces generally, the author ventured to state that the key-note of success so far as fuel economy is concerned depends almost entirely on the question of recuperation. This applies both to furnaces fired from the producers and to those using town gas. Recuperation was too large a subject to treat in one paper; but it is evident that a large amount of work has yet to be done in connection with the scientific design of these organs—in fact, it may be said that the subject up to the present, so far as it concerns furnaces with working temperatures of about 1000° C., has by no means been fully investigated.

He also suggested that, just as the manufacturer of gas or steam engines is required to furnish a complete heat-balance, showing working efficiencies, so is it equally essential that the furnace maker should be encouraged to supply thermal balance-sheets showing the extent to which the heat of the fuel is utilized, and also the heat losses in the various organs. Only by such conclusions would it be possible to increase fuel efficiencies by careful investigation as to where the heat losses occurred.

DISCUSSION.

Dr. HARTLEY (Richmond Gas-Stove Company) said a small point to which he took exception was Dr. Walter's statement as to the importance of selecting fuel on its calorific value. His view was that probably the more important fact was calorific intensity. While producer gas might be equally efficient as coal gas in steam-raising, in high temperature one could not get the same result with producer gas as with coal gas. From the manufacturers' point of view, coal gas made the strongest appeal. In solid-fuel furnaces of the producer type, it took twenty-four hours to get a furnace hot; but if used on the intermittent process, the periods of working must be of sufficiently long duration to justify its use. As to the oven-furnaces, the matters of importance were the duration and temperature of operation. A furnace of the ordinary type had to be in use for many hours before one could get recuperation. As to atmospheric conditions within the furnace, it was important to know whether the reduction of the hydrocarbon content would interfere with them. They were pretty well convinced that the atmosphere within the oven was determined by the water gas equilibrium. As to fuel employed, what was required in regard to coke was coke that was not friable. His personal experience in reference to oil-fuel was that thermal efficiencies were lower than those obtainable by coal. This was due probably to inability to burn the oil without an appreciable excess of air. The question of cost was of course an important consideration; and attention was being directed by makers of furnaces to the use for many manufacturing processes of the simpler type of furnaces. There were many operations in which such furnaces could be used efficiently. The object of preheating air or gas or both was to take the thermal energy from the waste products, and get it back into the load. He thought it was more efficient to preheat the load directly.

Mr. R. S. RAMSDEN (Leamington) expressed his gratitude to the Birmingham Gas Department, and more particularly to Dr. Walter, for their research work connected with the industrial use of gas. While it had been an undoubted benefit to the department, it had also been of advantage to other gas undertakings; and he made personal acknowledgment of the value of the advice given him, which during the war period was from an industrial point of view very important.

Mr. C. F. W. RENDLE (Redditch) observed that, in connection with the manufacture of needles, an important point in hardening was the formation of soot, which prevented the needles sticking together during the operation of quenching. In the history of needle manufacture, the best type of furnace was believed to be the old-fashioned direct coal-fired type of furnace. Difficulty was experienced in removing this view; but thanks to Dr. Walter it was shown to be quite possible to treat fine articles, like needles, &c., just as efficiently in the tubular furnace as in the old-fashioned type of furnace. They could be hardened with an entire absence of scale.

Mr. G. F. HURST (Davis Furnace Company) asked if Dr. Walter would define more precisely his views as to what constituted efficiency in a furnace. If they could not take as efficiency the amount of heat units put into the work, they did not seem to get very far.

Mr. J. F. ASKAM (Messrs. John Wright & Co.) said efficiency rested largely on recuperation of the load itself.

Dr. WALTER, in reply to the points raised, fully agreed with Dr. Hartley as to the consideration of calorific intensity of the fuel, and said that, especially when they came to consider high-temperature work, the question of the calorific intensity of fuel was of the utmost importance. At the same time they had to cater for a large variety of other forms of furnaces; and in Birmingham there was a great industrial load consisting of the direct low-fired pressure gas type. His main point in advocating a high calorific value gas for furnaces of this type was that the effect of lowering the calorific value could, up to a certain point, be compensated for by increasing the amount of gas supplied. Nevertheless, the limiting point was reached when, with this particular type of furnace, they found it impossible to burn the B.Th.U. equivalent of low calorific value gas, owing to the design of the furnace not permitting of this. He agreed that the question of calorific intensity was perhaps in the majority of cases more important; but he had referred to the question of the use of a high calorific value gas as being important in the particular instances mentioned. Alluding to Dr. Hartley's remarks on the temperature gradient of the load, he recalled that he had had an opportunity of going into the matter very carefully with Dr. Hartley a few years ago; and he quite appreciated the point he had made. Dr. Hartley also made some interesting references to the question of the atmosphere within the working chamber, so far as it was affected by the composition of the gas used as fuel. This was possibly a subject of research by Dr. Hartley; and they would be glad to have his findings at a later date. In regard to recuperation by pre-heating of the load, he had mentioned this matter in connection with direct-fired furnaces. The pre-heating of the load was a simple method of taking up B.Th.U. from waste gases. But it was not always convenient; for in many cases where they would like to make use of this principle they could not, on account of the double handling of the load then involved. He thanked Mr. Rendell for his kind remarks in regard to the assistance given at his works, and was glad to note that the research department had been of some value in enabling other undertakings to avoid going over the same ground. Taking up the point raised by one of the speakers, who thought a remark about gas at 1s. per 1000 c.ft. should not go forth to the public without relation to the cost of other forms of fuel, he explained that he merely mentioned this for comparative purposes, and not with a view to suggesting that they were at all likely to get back to this figure. With the efficiencies which were now obtainable—they had got up to 40 p.ct. in certain types of modern furnaces, as compared with 19 p.ct. obtained before the war—he cited 1s. per 1000 c.ft. for gas as representing a pre-war rate, which should, of course, be compared with the corresponding rates for other kinds of fuel. He reminded them that in Birmingham they had, before the war, sold gas at this price; and if they could revert to these conditions, they would stand a very big chance (having doubled their efficiencies) of an extension of town's gas for industrial purposes to fields which it had been impossible to anticipate hitherto. As to one point advanced on the question of calculating efficiency, it was difficult to determine whether they could consider a furnace to be a heat engine, because no mechanical work was done. Making a comparison, he remarked that the efficiency of a gas-engine was independent of the nature of its load, whether it drove a dynamo or any other machinery; and it could be stated irrespective of the load. Unfortunately, they could not state what the efficiency of a furnace was without reference to its load and the nature of it. This was why figures of efficiency could not be published by makers of furnaces. It depended on the load to be placed in the furnace. Therefore, they could only suggest that some basis of efficiency should be formulated (it certainly was possible) which should take into account the whole of the heat utilized by the furnace, not only in heating-up its working load, but in overcoming radiation losses. He considered it was possible to formulate a scheme which would give them an efficiency of this kind, and which would be very useful in comparing the performances of different types of furnaces.

VOTE OF THANKS.

On the motion of the PRESIDENT, seconded by Mr. PATERSON, a hearty vote of thanks was accorded to Dr. Walter for his paper.

Dr. WALTER, returning thanks, pointed out that a broad view was taken as to the administration and purpose of the research laboratory. The aim was not to exploit gas. They were employing furnaces other than gas for certain purposes, when found to be more satisfactory or economical. The shops and the laboratory were fitted up with a variety of furnaces, including coke-furnaces; and if gas fuel was not the most suitable to the requirements of a manufacturer, he frankly told him so. He could quote numerous cases in which large installations of gas-furnaces were proposed; but he had reported against their use because he recognized that better results could be obtained with another kind of fuel. Gas as a fuel had huge possibilities, of course; but he was not blind to the fact that, for some purposes, other fuel might be more advantageous to the user, and he said so. In the majority of cases, gas-furnaces would compete with any other kinds of fuel.

THE NEW UNEMPLOYMENT ACT.

The PRESIDENT, on the question of claiming exemption under the Unemployment Act, stated that the position for the industry was most unsatisfactory. Attention was to be called in the House of Commons to the unfairness of its provisions.

LIGHTING FITTINGS AND HOUSING SCHEMES.

A short discussion ensued on the question as to whether lighting fittings could be included in the equipment of houses built under the schemes of local authorities.

Mr. RAMSDEN stated that the Midland Housing Commissioner had intimated that he could not sanction payment for such fittings. Presumably this step was taken on the score of economy. He intended to take the matter up with the British Commercial Gas Association; and he would like to know what was the experience elsewhere.

The PRESIDENT stated that at Banbury the Surveyor and he had agreed to half the expense, on the understanding that everything would be cut out but gas.

Mr. BRIGGS mentioned that at Dudley light fittings were sanctioned in one housing scheme for 200 houses; but in two other schemes he had been told not to put in gas-lighting fittings. This was because there was keenness about electric light.

Mr. W. C. JONES observed that in a scheme for 88 houses at Brierley Hill all the gas-fittings were included. He was not sure, however, whether the glassware was struck out.

The PRESIDENT pointed out that such information would be welcomed.

The meeting then terminated.

Bye-Product Coke-Ovens in the United States.—Altogether 853 bye-product coke-ovens are now under construction in the United States, scheduled for completion before the close of the current year. In 1919, 758 new ovens were completed and 510 added to existing plants. Owing to the great demand for coal bye-products, there is a rapid growth in the extension of the bye-product coking industry. The iron and steel industry is responsible for virtually all the developments of this character.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Opening Meeting.

The very large attendance of members of the Association at the opening meeting last Friday evening, in the Westminster Technical Institute, Vincent Square, S.W., promises well for the success of the 1920-21 session.

Mr. F. A. FROST (South Metropolitan Gas Company), who occupied the chair at the commencement of the proceedings, remarked upon the growth in membership of the Association. Last session the increase constituted a record; and the gain looked like being even greater this year. There were, however, in the area covered by the Association still a large number who were eligible for membership; and he hoped those who were already members would do their best to bring them in, to the advantage of all. He would now come to the main business of the evening, which was the induction of the new President, and the delivery of his address. A few remarks of his would suffice to introduce Mr. Pearce, who was well-known to most of those present. On the Council he had already given many proofs of his sterling qualities, and, above all, of his readiness to do everything possible to further the interests of the Association.

Mr. FRANK J. PEARCE (North Middlesex Gas Company), who was cordially received, then took the chair and read his address, the main parts of which are given here.

PRESIDENTIAL ADDRESS.

In presenting my address to you this evening, I propose to take as a basis for my remarks the question of efficiency. In all industries, efficiency is of prime importance at any time. The old maxim that a thing worth doing at all is worth doing well still holds good; and it is of particular importance at the present time. We are concerned with its application to the gas industry; and its importance in this connection at the present time cannot be over-estimated.

In pre-war days the industry was in the happy position of having a plentiful supply of cheap raw material, and labour at reasonable rates. Unfortunately, those days have departed, and we now have scanty supplies of raw materials, often of indifferent quality, at exorbitant rates, which, coupled with the ever increasing demands of labour, render the successful carrying on of a gas-works a very difficult proposition. At the present time, to mention only three items, coal has increased in price by 200 p.ct., oil by 600 p.ct., while labour is up by 150 p.ct. If one counts the shorter hours and the smaller amount of energy expended per individual worker, the increase is considerably more than this. In these circumstances, it is only by increased efficiency that any saving can be obtained; and it would appear that the main hope of the industry lies in its ability to obtain from the raw materials at its disposal larger amounts, not only of gas, but of the various bye-products, the proceeds from the sale of which form such a considerable addition to the revenue of all gas undertakings.

ELIMINATE WASTE.

This, however, is not the only way in which saving is to be obtained, for the elimination of waste of all kinds and in every department is a matter which must receive the earnest attention of all, not only of those who may be in charge of a works or large department, but of those in subordinate positions—in fact, I would go so far as to say of each individual worker, whatever his position, if he has the prosperity and interests not only of his employer, but of himself, at heart.

Having thus briefly dealt with the necessity of adopting such methods as lead to an increase in efficiency all round, I would like to consider the means by which this result may be obtained. Leaving out of consideration the quality of the raw materials employed, the desired results are dependent on: A, the plant employed; B, the persons employed to work the plant. In the latter, I include not only the trained technical staff, but also the manual worker, who directly operates the particular plant; and I hope to show how successful and economical working really depends on the attitude adopted by this section of the staff.

I do not propose in this short address to enter into a discussion on the merits of the different kinds of apparatus on the market for the manufacture of gas and recovery of bye-products, but wish to confine my remarks to the efficiency of the persons employed, and to some of the means which may be adopted to obtain and maintain good results. It will be quite obvious to most people that it is futile to instal the latest and most efficient type of apparatus of any kind if the man who is to work it is not capable of obtaining the best from it, or, in other words, is not efficient. The degree of efficiency attained by the individual depends on two main points—first, the education and training received during apprenticeship, and, secondly, the amount of real interest taken by the individual in his work.

SCIENTIFIC AND TECHNICAL KNOWLEDGE.

It is only during recent years, I regret to say, that the real value of scientific and technical knowledge has come to be generally recognized in its application to gas-works practice. Only a few years ago, on large numbers of works, the chemist was almost unknown, and the manufacture of gas was carried on in a very haphazard manner. This was the state of affairs when, some years ago, the Junior Gas Associations came into existence; and I make bold to state that it is largely by their efforts that things have been altered so much in this respect.

If a youth leaving school desires to enter the ranks of the gas industry, he should have laid down for him a definite course of study, extending over a number of years and terminating with a "final" of "diploma" course. During this course of study, he should augment the theoretical knowledge obtained with practical experience of gas-works routine, obtained preferably on a medium-sized works; so that when his period of apprenticeship and tuition comes to an end, he will be of some real use on a works and able to stand on his own feet. I wish to emphasize the importance of a "course of study" being laid down. This is necessary, because the management of a modern gas-works calls for the exercise of wide and varied technical knowledge of subjects which might very well be thought to be beyond the range necessary on a gas-works; and unless in the early stages of his tuition a student receives very definite guidance from those competent to act in such a capacity, he is likely to go astray and waste valuable time to no good purpose. To my mind, this very specially applies to those who live in the Provinces and away from the great centres of industry. They are in a large measure isolated, and probably have to make use of correspondence courses, and in this way may be cut off from the guidance which is now so easily obtained in the large centres. It is only by carefully following a course of study and working hard at it that the junior can hope to become an efficient senior.

During the last two years, the question of education has received a great deal of attention. In 1917, the Junior Associations, through their Joint Council, decided to approach the Institution of Gas Engineers with a view to improving the conditions under which instruction in matters relating to gas-works was carried on. Without going into details, the outcome of this was that the Institution appointed a Sub-Committee of five; requesting the Junior Associations likewise to appoint five representatives who would meet the Institution Sub-Committee in conference on this matter. The result of these conferences has been that a definite scheme of education has been drawn up, which, if carried out, should go far to improve the efficiency of those who in future decide to enter the industry; and I would at the same time add that their status generally will be improved. I hope I have made it clear that an efficient staff must of necessity be composed of men well trained and well educated in their profession; and it is with this object in view that the Junior Associations have worked so hard in co-operation with the Institution of Gas Engineers in formulating the new and improved scheme of education which will shortly be made public.

THE "MANUAL STAFF" AND EFFICIENCY.

Before leaving this part of the subject, I feel constrained to make a few observations with reference to what I will term the "Manual Staff"—embodying foremen, stokers, water-gas operators, boiler men, &c. Efficiency among these men is equally as important for the best results as among the technical staff. But it is very regrettable to find that it is often wanting; especially in these times, due largely to lack of any real interest in the particular occupation in which the man may be engaged. It is a very difficult matter indeed to get good results out of any apparatus worked by a man who does not care, or who, in other words, has a merely mercenary interest in his work. While I do not suggest that this applies to all—because I know that on many works there are men to be found who have a splendid record of service, and whose pride it is to put their best efforts, both of mind and body, into whatever duties it may fall to their lot to perform—yet it is an undeniable fact that large numbers of the workers in this industry seem to have no interest whatever in their work, beyond what is to be got out of it for the smallest amount of energy expended in return. This is not the spirit which makes for efficiency; and while this spirit prevails, it will not be possible to get the best results.

It is, of course, a fact that what I have referred to is not confined to the gas industry. It seems to be a condition of mind into which the individual worker often falls now-a-days, as a result of having become a member of one or other of the trade unions, whose doctrines appear to be very different from what they were a few years ago, inasmuch as directly a man becomes a member he appears to lose any incentive he formerly possessed to conscientiously do his best, but relies on his union to pull him through. Would any one of these men, if he allowed himself to pause and think in an open-minded way for a short time, say that he was honestly convinced that this course of action was right and beneficial either to himself or the industry in which he was engaged? I am sure the answer would be "No," because I believe at heart the average British worker is sound, but unfortunately allows himself to be thoughtlessly led away by the specious doctrines preached by those whom he calls his leaders.

TRAINING INEXPERIENCED MEN.

During the present year, I have had considerable personal experience in the training of inexperienced men and making them into efficient gas-workers; and it will tend to show how an inexperienced man will, if he takes some real interest in his work, quickly learn and become proficient. On Jan. 31 last, the unfortunate strike occurred at Mill Hill, when the union employees of the Company, numbering about 150, left their work. The task of re-staffing the works was immediately tackled, and from large

numbers of applicants, mostly ex-service men, sufficient were engaged to fill the places of those who had left. The large majority of these men had never been inside a gas-works before, and naturally a lot of weeding-out had to be resorted to before the most suitable were obtained. For the way in which these men tackled new and, to most of them, very laborious and exacting work, I have nothing but praise. The task of training an entirely new staff—of making these men into stokers, carburetted water gas operators, boiler men, engine men, sulphate of ammonia makers, and so on—called for hard work and steady application, to say nothing of great patience on the part of those who had to train them. Nevertheless, the task was rendered easier because most of the men took a real interest in their work and were anxious to learn. Speaking generally, I can say this interest has been maintained, with the consequence that they have nearly all become, in a comparatively short time, efficient workers. The results which are being obtained are equally as good as were being secured with the old staff, many of whom had a life-long experience of gas-works practice. I would urge upon those who have control of men, and those who will eventually occupy such positions, the importance of studying the personalities of those under their control, and of endeavouring, as far as possible, to look at matters from the man's point of view as well as their own. If this is done, it goes far to smooth away differences that may arise and to promote mutual good feeling, which is essential if the best results are to be obtained.

CHEMICAL CONTROL.

To deal briefly now with some of the methods by which increased efficiency may be obtained. I think that first and foremost among these stands the chemical control of the manufacturing plant. The working of all plant for the manufacture of gas and the recovery of bye-products is based on definite chemical reactions, and unless those in charge possess accurate knowledge of the reactions which are actually taking place, very serious waste can easily occur. As a concrete example, in a retort-house it is an easy matter not only to waste hundreds of tons of fuel, but to ruin the retort-settings as well by improper working. The necessary knowledge can only be obtained by making the chemical tests in a methodical and systematic manner; and if this is done, and the results used with good judgment, the final outcome will amply justify the time and trouble expended. The results of all tests made should be carefully recorded in the laboratory book. For the purpose of recording routine tests which have to be made daily or at intervals of two or three days, I have found it very convenient to use sheets, ruled and headed in a suitable manner, one line for each day, on which are entered all the routine tests made each day. Each of these sheets lasts a month, and at the end of the month it is filed away and a new sheet started. By adopting this method, one can see at a glance the results of all the tests made during the day without having to turn to different pages of a book where the tests would all be indexed under the various headings.

UPKEEP OF MACHINERY.

In the majority of works of any size, the use of machinery for the handling of material, charging and discharging retorts, and other purposes is very largely adopted to-day. The upkeep of such machinery plays a very important part in the general standard of efficiency obtaining at a works. It is of first importance that, wherever machinery is installed, there should be a competent staff of fitters and a machine shop, equipped in such a way that repairs can be carried out both efficiently and promptly. It creates untold disorganization and extra expense if, in case of a breakdown, the makers of a machine have to be called in to put matters right. In the case of a broken part, it frequently happens that the makers have not got one in stock to replace it, which means that work is delayed, or possibly gas-making partly suspended, until the new part can be obtained, with all the attendant inconvenience of extra expense which goes to increase working costs. It is good policy to carry a good stock of spare parts; and I consider money spent in this way well spent.

In all cases the machinery should be periodically inspected by a competent and responsible fitter, and, in the case of retort-house machinery, coal and coke handling plant, &c., which is in constant use, the examination should be carried out daily. It takes very little time, and it is infinitely easier to prevent a breakdown, by possibly the mere tightening of a slack bolt or some other such simple operation, than to have to repair a badly broken-down machine, which has probably also seriously interfered with the gas supply, and most likely at a time when the gas is badly needed.

In works where electric power is used, if it is not possible, owing to cost, to retain the services of a competent electrician, it is an excellent plan to put the electrical plant into the hands of a good firm of electrical maintenance engineers, who, for a fixed sum, will maintain all dynamos, motors, cables, switch gear, &c., in first-class working order.

There are many other ways in which saving can be effected. The lubrication of machinery is a matter which calls for greater attention than it often gets. Efficient lubrication does not mean the application of oil and grease *ad lib.* It pays to buy a good-class lubricant, and use it economically. As an instance, I was able to effect a saving of some 75 p.ct. by scrapping the existing lubricators in the engine room at Mill Hill and installing mechanical lubricators.

In the case of steam-driven machinery, which may possibly render necessary long lengths of steam piping, the careful covering of such piping with non-conducting composition to prevent condensation as far as possible is important, as is also the elimination of all steam leaks.

In the case of machinery which is run periodically for specific purposes, such as coke-conveyors, coal elevators, &c., it is important to see that they are shut-down immediately their work is finished; otherwise there is a needless waste of power and wear and tear going on. A revolution counter is a very useful instrument attached to such machines; and, if used, the index should be recorded daily, when any additional running of the plant can be immediately noted and if necessary checked.

The employment of recorders on different sections of gas-works plant is a great aid to the obtaining of good results. Many a man works better if he knows there is an instrument recording his actions, or the results of his actions.

Timekeeping is nearly always better on a works where a time-recording clock is used.

A very important item, and one which will have considerable effect on the amount of ammonia recovered, is the careful protection from the atmosphere of seal-pots, liquor tanks, and wells.

It should be the aim of those responsible to work-up ammoniacal liquor as strong as possible, as this means less bulk to store and handle. If seal-pots, &c., are not properly protected, a large quantity of ammonia is lost.

CONCLUSION.

I do not pretend that in the foregoing remarks I have covered the whole area embraced by the subject "efficiency." This would be a somewhat impossible task in the time at my disposal. The cases I have specifically referred to appear to me to be of first importance, but there are others, many of them also of great importance and having a large effect on working results.

The object I had in mind when I made this selection of a subject was, if possible, to bring before the junior members of the profession, many of whom are at the commencement of their careers, the great importance of personal efficiency, and the application of this efficiency to actual works practice, where so many ways are to be found of saving in small things and of improving results continually.

A VOTE OF THANKS.

Mr. FROST remarked that the address touched upon many points of vital importance. They were all in agreement with the President as to the need for making the great industry to which they belonged as efficient as possible; and they must therefore do everything they could to this end.

Mr. D. C. CROSS (Lea Bridge), proposing a hearty vote of thanks to Mr. Pearce for his common-sense address, said that one excellent example of efficiency was the manner in which the President's Company had managed their strike. It was a remarkable achievement in these days to have fought the matter and won in the way they did; for one or two men on the works had to take in hand the training of all the new men. To reach the highest state of efficiency on a works, there should be sufficient foremen and capable juniors to look after the unskilled labour. At present, a great many works were understaffed. It was not realized that to put a skilled junior to look after the plant would be the means of saving a tremendous lot of money. What could an unskilled man save in looking after the plant? Very little, as compared with a skilled junior. Yet how did the remuneration of the two compare? One could not expect skilled juniors, who were getting far less than unskilled labour, to hunt for ways to save a company perhaps hundreds of pounds, if their efforts were not going to be recognized. It was really no use talking about efficiency unless one was prepared to pay for it. An idea from which a company who had tried it received a great amount of benefit was the placing of a "suggestion-box" on the works. Into this all employees were invited to put any suggestions they might have to make for increasing efficiency; and at the end of the month the chief engineer went through the contents of the box, and divided-out a certain sum as bonus, according to the merit of the ideas put forward. As to one point mentioned in the address, it was astonishing to find what an amount could be saved by efficient lubrication. This matter should be put into the hands of a well-paid junior to supervise.

Mr. E. G. STEWART (Gas Light and Coke Company), in seconding, remarked that the President had illustrated his points by what happened on the works; but what he had said would equally apply to other branches of a gas undertaking. When they came to rock-bottom, the much-abused word "efficiency" meant attention to all small details, and a knowledge of their men, materials, and plant. When they thoroughly understood these things, they would secure efficiency.

PRESENTATION TO THE LATE PRESIDENT.

Mr. FROST then called upon the President to present a framed illuminated address to the immediate Past-President, Mr. Samuel B. Chandler, of the South Suburban Gas Company, who had for about five years occupied the chair.

The PRESIDENT said it was a great pleasure to him to make this presentation. Mr. Chandler had worked very hard in the interests of the Association, and was one of the principal means of keeping it together during the strenuous times of war. He had much more than earned this little token of their gratitude and esteem. The address set forth that the annual general meeting of the Association sincerely acknowledged its keen appreciation

of Mr. Samuel Chandler's excellent services as President during the sessions 1915-16 to 1919-20, and went on: "The business qualities and untiring enthusiasm he has displayed have considerably enhanced the position held by the Association in the industry—particularly during the war, and in the reconstruction year since its termination—and upon his relinquishing office the members wish him great success in his future career, and tender to him their sincere thanks."

EDUCATION A MOST IMPORTANT SUBJECT.

Mr. CHANDLER, in acknowledgment, said circumstances over which no one of them had any control had permitted him to occupy for so long the position of President. Whatever he might have done would have been impossible without the aid of a loyal Council, who had been as long in office as himself. They, with Mr. Winslow, had done yeoman service. It was a great gratification to realize that the Association stood higher to-day in the minds of the senior members of the profession than ever before. Education was the most important subject before them all to-day. It was exceedingly gratifying to know that the Junior Associations were intimately connected with the scheme that would ultimately be put before the whole industry, and which would go far to raise the status of what heretofore had been regarded as an everyday sort of trade. Gas to-day was a profession; and all those who were on the works side or the commercial side had to be men who to some extent possessed professional qualifications.

A SERIES OF LECTURES ON GAS-ENGINES.

The HON. SECRETARY (Mr. George Winslow) said the Association had been invited to suggest the name of a lecturer, and the subject of a series of lectures, to be given in the Institute. In accordance with their suggestions, arrangements had been made for a course of five lectures upon "Gas-Engines," by Mr. W. A. Tookey. The subjects would be: "The Modern Gas-Engine and Its Development;" "Gas Power Installations;" "Management of Gas-Engines;" "Comparison of Gas Power with other Competing Prime Movers;" and "Composition of Power Gases." The dates of the first two would be Fridays, Nov. 19 and Dec. 3; while those for the others will be fixed later. There will, of course, be a fee payable for attendance.

After a large number of new members had been announced, the remainder of the time of the meeting was devoted to social intercourse.

High-Pressure Gas Distribution.

Points connected with the distribution in San Francisco of gas at high pressure were dealt with by Mr. W. M. Henderson in a paper read before the Pacific Coast Gas Association. Explaining the methods employed there for the installation of the district governor, he said that, when properly installed, there will be little difficulty with its successful operation. It must be borne in mind that it is just as important to have a governor close tightly automatically, as it is to have it open at the required moment. Too many governors leak when supposedly out of service. This difficulty can best be controlled at the time of installation. Gas-tight valves are essential. It is necessary at times to remove the governor for the purpose of renewing the diaphragm or the seats. This can be done in the governor-pit; but his practice has been to bring the governors to the shop. In either case, a tight valve on the inlet and outlet is necessary. Then the dirt and scale carried in gas-pipes is very hard on valves or stopcocks, as, the valve being naturally open, sediment collects in the seat, or in the core of the cock. This is easily avoided by taking care to locate all valves on vertical piping. Then, when open, any sediment falls through, or if closed it collects on the disc, and is pushed off on opening the valve. Stopcocks for gas are not as satisfactory as gate-valves, particularly the large sizes. Another essential is the protection of the governor-seats against the cutting effect of scale passing with the gas at high velocity. For this, screens have been used with good results. On the inlet side of the governor, a special drip-pot is installed. The nipple fitted on the governor side is carried through to the inside of the pot, and a thread is left on it. A fine wire-mesh screen is then welded to a half-socket the same size as the nipple thread. This screen slips through the top of the pot, and is easily screwed tight on the nipple. Any scale carried by the gas will strike the screen, and fall to the pot. The scale will gather on the screens, and require cleaning; but this is easy, and is much preferable to renewing governor-seats. The governor-pits are all ventilated by installing a 4-in. wrought-iron pipe from the pit to the curb, and fixing a stand-pipe about 14 ft. high.

The late Mr. J. L. Scallan, of Dublin, for many years a Director of the Alliance and Dublin Consumers' Gas Company, left, by his will, £46,471.

The American Gas Association have prepared a cumulative list of rate increases reported to them by gas undertakings as having been secured up to Sept. 15 last. The list covers a period of just over three years, and contains 689 cases of rate increases in the United States. In about 600 instances more than one increase has been allowed in the period named.

MIDLAND JUNIOR GAS ASSOCIATION.

Opening Meeting.

The first meeting of the Association for this session was held at the Council House, Birmingham, last Thursday evening, when there was a record attendance of members.

The retiring President (Mr. Carrington Barber) presided at the opening, and introduced Mr. W. J. Pickering, the Superintendent of the Coal-Test Plant at Nechells, the New President.

Mr. PICKERING, who was cordially received, moved a vote of thanks to Mr. Barber, testifying to his public spirit, and to his active interest in the promotion of all matters for the Association's welfare.

Mr. C. F. W. RENDLE (Redditch) seconded the resolution, which was adopted with enthusiasm, and suitably acknowledged by Mr. BARBER.

Mr. W. J. Pickering, of the Coal Test Works of the Birmingham Gas Department, then delivered the following

PRESIDENTIAL ADDRESS.

After remarking on the value of the Junior Associations and pointing out the duties of members, he proceeded to consider the subject of

EDUCATION.

This subject has occupied much time and thought on the part of many workers in our Junior Associations, and has appeared for several years on the agenda at Joint Council meetings. It is gratifying to know that the large amount of spade work done in this connection is extremely likely to bear fruit in the near future, in the shape of a definite scheme which will affiliate the junior bodies with the Institution of Gas Engineers. This will be undoubtedly a step which will be warmly welcomed by juniors generally. For several years many of us have been looking forward to the time when membership of our parent Institution should be as much sought after, on grounds of equality of merit, as membership of the other institutions of the various branches of engineering. This would, of necessity, imply membership by examination, and the granting of a diploma to successful candidates. Such an arrangement would attract a larger number of well-trained men to the industry. The latter would benefit largely in consequence; while the Institution of Gas Engineers would become a real live body.

The vexed question of remuneration is, to my mind, intimately bound-up with this matter of education. The highly-trained man will always command a better salary than the man of lesser training; so that it is up to all our juniors to leave no stone unturned in their quest for knowledge and experience. Whatever profession he may select at the present time, it is essential that a man shall have a sound elementary knowledge of a general character as a useful foundation on which to build in attending further courses of instruction along more specialized lines. The want of this is often obvious in one's experience in teaching a technical subject; and youths leaving school are well advised to pass the matriculation examination before thinking of commencing study in special subjects. Further than this, the standard of education is constantly advancing; and the technical man of the future, generally speaking, will have a far better chance of success if he has had the advantage of a fundamental training in his subject at one of our universities or technical institutions. The certificates in Gas Engineering and Gas Supply have been rightly regarded as inadequate for some years past; and the institution of more extensive and properly-graded courses of study and of training, with final examinations of far more searching character than those now in force, should be keenly appreciated by all junior members in the industry.

QUALITY OF COAL SUPPLIES.

No one will deny the importance of this subject. Someone may say that coal of any quality is better than none at all; but given normal (or what we now have to regard as normal) periods—without coal strikes or other disturbing factors—it is a fact that the quality of coal supplies to gas-works leaves very much to be desired. Quite apart from such anomalies of coal control as the sending of steam coals to gas undertakings (although some so-called steam coals are quite good from a gas-making standpoint, and among these the semi-caking varieties give quite a good coke), the picking, screening, and washing of the coal at the collieries is not done with pre-war thoroughness. Some coals arrive on the works in so wet a condition that the ordinary mechanical handling arrangements cannot deal with them, and extra labour has to be put on to assist the coal travel at various points. Other coals are charged with lumps of hard batty material, which, in certain cases, fail to pass the crushers; while many of the coals received at the present time are far too high in ash content, and ought never to be sent on to a gas-works for this reason. Engineers cannot gasify inert material; and carbonizing costs go up proportionately, without taking into consideration the bugbear of excessive clinker formation in producers, with consequent damage to furnace linings, more labour required in attention to fires, difficulty in maintaining temperatures in settings, and last, but not least, the problem of the increased quantity of ashes. The latter is an avenue along which tremendous wastage of fuel occurs in many works; and the subject is worthy of more attention in some quarters than it has received in the past.

The coal question is aggravated further by the existence on one works of several types of carbonizing plant. While horizontal retorts are capable of dealing without trouble with a fairly wide range of coals, this is not the case with verticals, of either the intermittent or the continuous type; and coals which give rise to marked swelling of the charge during carbonization, or have a high caking quality, cause much trouble in vertical retorts.

Horizontals still occupy a favourable position from this point of view, and are likely to continue to do so. The salts of which some coals are relatively high in content give considerable trouble in coke-oven installations, and very probably are responsible for corrosion troubles in other types of plant also.

The question of design in producer grates is of considerable importance in relation to producer troubles occasioned by high ash content of coal. With grates of the usual type, using V-shaped fire-bars, it is extremely difficult to cope with the excessive amount of clinker, and more frequent "cutting-out" of the bottom of the fire is necessary. The newer type of grate, known as the "step" grate, has been proved to have decided working advantages in this respect. With this grate in use, the fires are more easily kept clean, and uniform temperatures in the settings are more readily maintained.

POINTS CONCERNING ECONOMICAL WORKING.

One hears the cry for economy on all sides in these times of high costs of materials and labour; and measures with this object in view have been instituted in all branches of our modern undertakings. The need for supervision of plant, as regards its condition and general working efficiency, is patent in this connection, and will be appreciated by all of us, no matter in what section our duties lie. We have to make the most of existing plant and apparatus; and much might be said of steps adopted to this end. As we are to have a paper on this subject during the coming session, I will not elaborate the matter further as regards supervision on this occasion.

A very noteworthy feature in connection with the problem of heat wastage on gas-works has been the installation of comparatively recent date, on many large works, of waste-heat boilers. Both on the main flue gases passing to the stacks from retort-house settings and the "blow" gases from water-gas plants, these boilers are working successfully, with undoubted fuel economy as a result.

The gas-fired boiler is also worthy of mention in this regard. Fed with producer gas, which can be made easily (even on smaller works) from relatively poor coke fuel, it allows of steam raising with a minimum of trouble and high thermal efficiency. I hope to be able to put before you some notes on an installation of this type at a later date. The idea has no doubt occurred to many of us that it would be decidedly advantageous to heat all gas-works settings entirely by gas-firing, with a battery of outside producers; and very probably the future will see further developments along these lines.

Fuel economy touches all classes of the community; and in this respect the inadvisability of consuming raw coal applies both to ordinary householders and also to the proposed national schemes of super-power stations. The urgency for so treating all coal that its valuable bye-products shall be recovered and marketed becomes more pronounced as the years pass by. In this connection most of us will welcome the introduction of the "all-gas house," when this becomes a possibility on financial grounds; and while our national conservatism tends to cause prejudice in favour of coal-fires to die hard, I think general economy of living will, sooner or later, banish raw coal from the household. The prospective advantages as regards lessened labour in the home, and gain in health to the community generally by reason of smoke abatement, will be admitted by everyone. Under existing circumstances, however, one ventures to doubt the advisability of an entirely gas house, partly because of the relative costs of coal *versus* gas when in continuous use, and also for the reason that solid fuel may be stored against a possible failure of the gas supply in times of serious industrial unrest, when the value of one ordinary grate in the house would be appreciated. The housing problems peculiar to the present time furnish, nevertheless, a splendid opportunity for developments as regards the use of gaseous fuel; and our distribution friends are fully alive to this. Most of us will have noted Mr. Goodenough's recent paper on this question of "Gas in Relation to the Housing Problem."

Processes on the works often afford scope to juniors to assist in securing good efficiency in working. Chemical plant on gas-works tends, and rightly so, to increase rather than decrease, and at many works junior chemists have definite duties on such plants. I know of some medium-sized works where the ammonia washing and scrubbing plant is directly under the control of a junior, and good results as regards efficiency of washers and strength of liquor made for sale are achieved. Whatever the plant may be, a measure of responsibility in this way should be welcomed by the junior; and he should seek, by general keenness and thorough working knowledge of the plant, to secure and maintain as high a working efficiency as possible, while keeping costs down by preventing undue waste of any kind. The field for the engineering chemist on modern works is of increasing importance, and one could mention several problems which have a bearing on this particular question.

Oxide purification is an instance where little change in apparatus and methods of working has taken place for many years. The purifier box has remained almost as it exists to-day for more than fifty years; and the question of the use of oxide of iron for H_2S removal is one which is not, even yet, fully understood in all details. An amount of careful and fairly successful research work was carried out prior to the war on methods of liquid purification of gas, and work on these lines will no doubt be proceeded with as opportunity offers in the future. Valuable ground space would be saved by a reduction in the number of purifier boxes, and the cost of purification would be reduced as regards labour required for box changing.

Naphthalene troubles have afforded considerable scope for the gas-works chemist, as careful investigation is necessary before any particular method of cure or prevention is adopted, and regular testing by way of supervision is also essential to secure proper working efficiency of whatever plant is installed. The problem has cropped up, in slightly different form, during recent years owing to the "stripping" of gas for the extraction of crude benzole, which has thereby reduced the hydrocarbon content of the gas, and also by reason of the fact that gas leaving the works has been, generally speaking, at a higher temperature owing to the larger volume of gas made per unit of carbonizing plant.

It would seem that the best method ultimately of dealing with the naphthalene problem would be by way of removal of the naphthalene at as early a stage as possible on the gas stream. Dr. Carpenter's method of shock-cooling the gas in specially designed water-cooled condensers, and at the same time washing the gas with thin tar, is modern practice in this respect. The naphthalene question is aggravated by deposits of the crystalline compound in the mains on many large works, and until these are removed methods of washing or spraying the gas with "cold" solvents will need to be continued, in order to prevent the gas picking up and carrying forward to the district naphthalene from these deposits.

Recording instruments for indicating both pressure and quality of gas are important features on most large works; and the care of these usually falls to the chemist. Properly looked after, so that their readings may be relied upon, these instruments are of undoubted help to the engineer; but regular supervision and checking is very necessary. The installation of instruments recording calorific value and specific gravity on works streams of coal gas and water gas will give timely indication of fluctuations in quality; so that occurrences in the retort-house and elsewhere, which might otherwise not be detected until more time had elapsed, can be quickly dealt with. It is very probable that, in the near future, instruments of this nature will be placed out at certain points in the distribution area, under the working of the Gas Regulation Act; and very useful data should be forthcoming from such a course.

CALORIFIC VALUE.

The whole question of testing gas for calorific value, which has been of interest to some of us for many years, has taken on fresh significance by reason of the proposed method of charging for gas on the "therm" basis. There are, of course, two main objections to the use of the more accurate instruments of this type in connection with smaller undertakings—first, the relatively high cost of apparatus, and, secondly, the absence of anyone sufficiently competent to carry out tests. When the official type of instrument is decided upon—and as early a settlement of this matter as possible is desirable—the price should be capable of reduction by production in quantity; while the second objection might be met by undertakings combining to provide a competent tester. It has been suggested that samples of gas might be taken by the tester from smaller works and tested on an official calorimeter elsewhere, and also that a portable instrument might be devised. But both ideas are open to objection in regard to the use of the present high-class calorimeter of the "flow" type.

In view of the enhanced importance that will obtain in the future of accuracy in testing, it will be well that the apparatus be so designed as to eliminate, as far as this is possible, chances of personal error on the part of the tester, quite apart from the need for periodical checking of the thermometers used in such apparatus. However, a way out in the case of the various points of difficulty will have to be found, as there is general agreement that charging for gas on a heat-unit basis is more fair and just to the consumer than the present volume charge arrangement can possibly be.

THE FUTURE OF THE GAS INDUSTRY.

Labour topics were touched upon, and then the President proceeded: A young fellow just entering the gas profession asked me a few days ago if I thought he had made a good choice in this respect. In reply I assured him that he would do well, provided he were prepared to work hard along right lines. A spirit of optimism is a great help in itself; and I feel assured that we can look forward to a successful future for the industry in which we are engaged. The way is not going to be easy, for these are very troublous times in which we live; but difficulties are made to be surmounted, though progress may be slow. What are the future demands to be? One of the most urgent, I think, is a supply of gas to the public at such a price that it will pay to use gas entirely rather than coal as household fuel. At present, the "all-gas house" is hardly the best financial proposition, hence coal is wasted in inefficient domestic grates. The problem of cheaper gas is largely a carbonizing one, and is receiving attention by many investigators. But prices of gas are affected locally to a great extent by cost of coal and revenue from disposal of residuals; and because one authority is able to sell gas at the pre-war figure or below it, this is no valid reason for expecting other

concerns to do likewise, whether they are private companies or municipal undertakings.

The question of complete gasification of coal has aroused considerable interest during the last twelve months or longer; and the industry would welcome the presentation of reliable figures giving results obtained with this type of plant. Here, again, it may be mentioned that policy as regards relative merits of carbonizing systems is not determined solely by maximum heat units, as gas per ton of coal, since the matter must be reviewed in all details, taking the yields of all the various residuals into account. Local conditions and markets are an important factor in such considerations.

With regard to plants for the manufacture of water gas, it is likely that the "carburetted" type will, in the near future, pass out of use so far as the gasification of oil is concerned, since the available world supply of oil is running short. The blue-gas plant is an important feature of modern gas-works practice, and its utility is undoubted. Although, on a cost per 1000 c.ft. basis, "blue" gas is, under certain conditions, dearer than coal gas, the great value of the plant as a stand-by outweighs any disadvantages concerning it.

What of the future in regard to our relations with the electrical industry? The special adaptability of electrical plant for certain industrial power purposes is conceded as readily as anyone by the present-day gas engineer, and the amount of such plant on modern works tends to increase. Each of the industries has its particular field; and both realize this. Developments may be seen as regards the conversion of gas into electrical energy. Some form of gas-turbine may be evolved which will revolutionize present methods and bring down the price of the electrical unit. Whatever happens, we and our electrical friends have to bear in mind that, as great public servants, it will always be our duty to proceed on lines which will confer the greatest benefit on the community. Publicity is to be welcomed at all times, and its advisability, in general, as well as its value, is beyond question. In this connection, I should like to emphasize the fact that the gas industry owes a great debt to the men who day by day come into contact with consumers generally—I refer to the district inspectors in particular. Ability and pertinacity count for much in their work; and they are, as a part of the commercial section of our undertakings, to be congratulated upon the results achieved.

Mr. W. BENT (Stoke-on-Trent) moved a vote of thanks to Mr. Pickering for his address, and bore testimony to his unostentatious and conscientious work on behalf of the Association, over a long period of years. For seven years he occupied the position of Secretary.

Mr. T. F. E. RHEAD, M.Sc., in seconding the vote, congratulated Mr. Pickering upon the honour conferred upon him, and said the Association was to be equally congratulated upon having the services as President of a man who had done a lot of work in an unassuming way. The record attendance was a tribute to the esteem in which Mr. Pickering was held. The comprehensive survey of the gas industry made by Mr. Pickering was most interesting, particularly in regard to the subject of education. No excuse was necessary for urging the need for education upon those entering the gas industry. The modern cry was for cheap energy and for coal conservation, These two things pulled different ways. The best way in which the industry could face these problems was by the employment of men who understood the fundamentals of their professional work, and who were able to apply theoretical knowledge to works' practice. If a junior on entering a gas-works' staff was not reasonably well educated, he should lose no time in repairing the deficiency before commencing to specialize. If he had a good general education he could begin at once to specialize; and if he went thoroughly into the sciences he took up, he would develop a critical and deductive mind. It was the development of the thinking faculties that mattered probably more than anything else, because with a trained mind a man might be in a position to improve upon existing processes or to suggest new processes. The bulk of the studying on general subjects should be done before twenty-one years of age, because after that social engagements were apt to creep in.

Mr. C. F. W. RENDLE (Redditch) supported the vote of thanks to Mr. Pickering, and emphasized his point as to the importance of a good quality of coal, although at the moment perhaps quantity was the more interesting consideration. It did not appear that the time was yet ripe for the starting generally of "all-gas" houses. To give an incentive in works' practice, he agreed that it was a good plan to place a junior in charge of one piece of work, as this created the spirit of responsibility and individuality. It was important that labour problems should be considered in a judicial spirit.

Mr. R. G. MARSH (Birmingham) said it was quite refreshing to find tribute in the address of a President who was on the works' side, to the excellence of the work done by those on the gas department's commercial staff. The "all-gas" house was already a feat accomplished many times over in the Birmingham area of supply; and he had no doubt that there would be substantial developments in this direction. He agreed that the relations between those engaged in the gas industry and those in the electrical industry were more cordial than formerly; and he hoped that this spirit would be fostered.

Mr. T. H. POULSON (Stafford) said, with regard to vertical retorts, he agreed it was difficult to deal with various classes of coal. One trouble could be got over conveniently, if there was a sufficient supply of coal, by using one bed for one class of coal. The use of step-grates was undoubtedly of great advantage; and he knew of one instance where useful work was being done by a grate of the gilled type. The clinkers formed were very small, and the labour attached to each was insignificant. Also the amount of coke which was pulled off the fire was really negligible.

Mr. CARRINGTON BARBER regarded the paper as one of the most interesting presented in recent years.

The resolution was carried with enthusiasm.

Mr. PICKERING, in reply, said what he had done for the Association had been a labour of love. The "all-gas" house was to be welcomed. He was quite aware that there were a number in existence in Birmingham; but with coal and gas at their relative present prices, he thought the "all-gas" house was a thing not yet to be fully developed.

The meeting then terminated.

SECURING INDUSTRIAL BUSINESS.

In the past, said Mr. R. G. Logue in a paper submitted by him at the annual convention of the Pacific Coast Gas Association, the man looking after the industrial branch of a gas company's business has in most cases not been a specialist; and gas companies have often seemed to avoid employing men intelligent enough in industrial lines to discuss problems properly with manufacturers. The time may come too soon when gas companies will have a surplus of product, and will again be fighting for business; and in order to entrench themselves so strongly with industries that only a national catastrophe could materially hamper their business, gas companies must employ high-class, intelligent, educated men. The industrial salesman does not necessarily have to be a chemist or a metallurgist, or have to know as much about a man's business as he who operates it; but he should have enough knowledge to instruct manufacturers intelligently regarding the first rudiments of gas-furnace use. He must also be competent to converse with intelligent operators of gas-furnaces. He must be a specialist in the correct operation of industrial gas appliances. Such a man must know the rudiments in the manufacture of various raw products. It was always necessary, but is more so to-day, that the man required should be well paid. In his line he is expected to know more than the new-business manager, and more than the general manager; and the man selected should be of such a calibre that either or both of these officials would profit by frequent association with him. The large user of industrial gas in some localities is desired; but more particularly it is essential that the industrial gas man should develop the hundreds of small users, especially on the undertaking's existing lines of mains. The user of an industrial appliance operates it approximately the same time every day in the year. The consumption is ideal, as it permits almost perfect distribution. The practice of charging a low industrial rate has produced extravagance; and the time has come when the price of gas to industries should be such that it will be necessary for them to instal highly efficient appliances to permit its use.

GAS FOR BAKERIES.

There is not a bakery on the mains of the Southern California Gas Company using any fuel other than gas, declared Mr. C. M. Grow in a paper which he read at the twenty-seventh annual meeting of the Pacific Coast Gas Association; while three years ago they did not have a single installation. The Company have designed and put into use a double-swing low-pressure baking-oven burner which operates on 3-in. pressure, and heats the usual 9 ft. by 13 ft. Dutch oven in an hour, consuming 550 c.ft. of gas. The burner is simple (being made-up of pipe and fittings). It consists of three elements, each with a double air mixer, controlled by a ½-in. lever-cock. The flame of one element is 16 in. The second element when lighted adds 16 in. to the flame; and the third brings the total flame to 48 in., without the expense of a motor and blower. In rare instances where the pressure is below 6 in. water column, the Company instal the usual motor-driven burner. The principle involved in connection with a Dutch oven is that of heating the interior surface of the oven which is later actually used for baking the bread or pastry. This is accomplished by using a long flame, which can be swung from side to side and to the centre. After an hour's firing, the oven is closed and allowed to ripen to a uniform temperature. It is then loaded, and the bread is baked in a receding heat. As distinguished from this process, the continuous baking oven is fired constantly from a furnace at the floor-line; the heat passing to the rear, and over the top and sides to the stack. The baking area is thus heated by indirect heat. When the oven is brought to the required temperature, it is loaded with a large quantity of cold dough; and care must be taken to have a reserve burner capacity sufficient to tide-over the critical moment. Otherwise the installation will be regarded as a failure. This sort of furnace may be fired by four 1¼-in. low-pressure atmospheric burners, or one 3-in. patent burner, having three valves. A maximum gas consumption of 900 c.ft. per hour should be provided for the furnace; and the average consumption will be 400 c.ft.

Work of the Chesterfield Gas Board.—The Mayor of Chesterfield (Mr. W. H. Edmunds), at a meeting of the Town Council, has given an interesting report on the work of the Gas Board, which now, under the Greater Chesterfield Scheme, ceases to exist. He referred more especially to the valuable services of Alderman Johnson Pearson (the Chairman of the Board), and compared the position of the gas undertaking to-day with what it was under the old Company in 1896. The gas sent out in 1897 was 64,693,500 c.ft.; and in 1920, 243,777,900 c.ft. The number of consumers had increased from 1500 to 12,583, and the revenue from £12,852 to £67,507. The Whittington Gas-Works had been purchased for £51,000.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

One-Farthing or 0·2d. Movements per Therm.

SIR,—I think the respective proposals of Mr. Ibbs and myself may be summed-up as being inspired in the one case by a desire for convenience in book-keeping, and in the other for the understanding of the public. Your readers having had all the arguments before them will be able to decide upon what suits their own particular case.

CHARLES CARPENTER.

South Metropolitan Gas Company, Nov. 1, 1920.

Complete Gasification.

SIR,—The abstract of Sir Arthur Duckham's paper read before the Institution of Petroleum Technologists, and his remarks on complete gasification plants, and also your leading article on the subject of the paper, are of particular interest to me, as we have had in operation at the Harrogate Gas-Works for the past two months a plant for complete gasification, which in a large measure achieves many of the ideals which Sir Arthur describes.

The plant is contained within one arch of a horizontal retort-bench, the only apparatus outside the limits of the arch being the blower; and even this could be accommodated within the arch if a turbine or electric motor were used. Briefly, the process is as follows.

Coal is charged into the horizontal retorts in the ordinary way, either by hand or machine, and on being carbonized is pushed-out into a water-gas generator. During the "blow," the producer gas is utilized to heat the retorts; and during the "run," the water gas passes through the retorts, sweeping out the coal gas into the hydraulic main. The setting is so arranged that the producer gas and water gas do not mix to any appreciable extent.

The coal is carbonized at a low temperature; and the gas produced is swept-out of the retorts by the water gas immediately it is made. The whole of the tar and ammonia is retained; the tar being very fluid. The plant is also designed to enable the tar to be gasified, if desired. Nothing but clinker and ash is drawn from the producer.

The tests already carried out show that we are obtaining well over 60,000 c.ft. per ton of coal of 325 B.Th.U. (gross). One test of calorific value last week gave 365 B.Th.U. Further experiments are being made; and I hope at a later date to give more particulars of the plant and its working. I may say that we are obtaining from 180,000 to 200,000 c.ft. per day from it; but I expect to increase this output considerably in the near future. A patent has been taken out for the plant.

FRANK H. ROBINSON.

Harrogate Gas Company, Nov. 1, 1920.

Sir Arthur Duckham's Ideal System of Coal Gasification.

SIR,—I have read with great interest the remarks on the above subject in the issue of the "JOURNAL" for the 27th inst., from which it appears that Sir Arthur Duckham's ideal system is to carbonize the coal in vertical retorts superimposed over water-gas producers, thereby obtaining a mixture of coal and water gas and conserving all the valuable bye-products, such as tar, ammonia, &c.

It may be of interest to your readers to hear that in the year 1884 I took out a patent for a similar process, except that I proposed to carbonize the coal in horizontal retorts heated on the regenerative system, and convert the coke into water gas in the basement of the retort-house (constructed loftier than usual, in order to accommodate the generators), utilizing the blow to form producer gas for heating the retorts, by leading it into a large flue worked under slight pressure, so as to convert the intermittent production of producer gas into a steady supply for heating the retorts. The gas was controlled by dampers to each setting, and a sufficient number of generators installed to ensure an adequate amount of producer gas for the purpose—some of them, if necessary, being used as producers under a smaller blast of air so as to secure this result. In this process, the blue water gas produced was to be taken through a separate system of mains in suitable districts surrounding the gas-works, and sold for industrial purposes at 6d. per 1000 c.ft. I read a paper on the subject, entitled "Gaseous Fuel," before the Gas Institute; and a record of it will be found in the "Transactions" for the year 1885. It has been a source of much satisfaction to me to find the Fuel Research Board reporting to the Board of Trade in favour of the latter proposal, and now Sir Arthur Duckham advocating the former.

In addition to the patent I took out for the manufacture of gas as above described, I also took out a patent at the same time for a large and powerful gas-engine, to utilize some of the industrial gas thus made available. Unfortunately, my means did not permit me to bring either of these projects to fruition; but they aroused considerable interest through being brought before the gas industry in a series of letters which appeared in the "JOURNAL OF GAS LIGHTING." This led to my being sent to Essen, where the only blue water-gas plant in Europe happened to be employed for an industrial purpose.

This trip shows an illuminating contrast between English and German commercial methods. Upon arrival at Essen I took up my quarters at a hotel which happened to have a large garden attached to it. I asked the landlord if I could walk in this garden before breakfast, and he kindly consenting I spent an hour or so there each morning. The landlord came and joined me, in order, as he said, "to practise his English." One morning he said to me, "I see Herr —— spends a lot of time in your company; did you know him before?" "No," I said, "I never saw him until yesterday" (when he was introduced to me by the head of the firm using the water gas). "Do you know we consider him the leading engineer in Germany?" "No, I had no idea of this." Herr —— was a pleasant man, who spoke English perfectly, and helped to make my visit agreeable. He kept me talking about my two ideas, especially the gas-engine, and seemed to know all about the matter. A few years after, the Germans produced the first large gas-engine, and have been making them ever since—some as large as 4000 H.P., I believe. Then the Yankees followed suit; and lastly an American firm brought them to England (their original home).

If the English Government had had German commercial acumen, and taken some interest in poor inventors, the English nation would have had the benefit of the manufacture of these large gas-engines, instead of the Germans and Americans, and also of the ideal method of treating coal outlined in this letter, thereby realizing enormous profits, saving millions of tons of coal, giving much additional remunerative employment to the workers, and, by mitigating the smoke nuisance and so restoring the sunshine, creating an A1 instead of a C_3 population. Perkin's coal-tar dyes are another case in point.

All I got out of my inventions was the privilege of paying patent fees to the State. I have come to regard the taking out of a patent as a peculiar form of imbecility, which causes the victim (who is generally a poor man) to pay away his hard-earned savings to give his most cherished ideas to his rivals in trade. For an idea cannot be patented, but only the patentee's particular method of carrying it out; and when once he has, through the medium of the Patent Office, given his idea away, his trade competitors can find plenty of ways of carrying it out—and "so the poor Dawg has none."

H. TOWNSEND.

Wakefield, Oct. 28, 1920.

The "Gasfilled" Electric Lamp.

SIR,—In your issue for Oct. 27, you refer to a letter of mine published in the correspondence columns of the "Electrical Review" for Sept. 3, under the heading, "The So-Called Half-Watt Lamp," and credit me with saying ["showed" not "saying" was the word used—ED. G.J.] that "the gasfilled lamp in the matter of efficiency in relation to cost is no better than the metallic filament lamp." I said nothing of the sort. My reference was to the two new sizes of low wattage lamps which I pointed out were not a sound proposition commercially, whereas you include the whole range of gasfilled lamps.

I, as an electrical, am fully alive to your deadly hatred of the gasfilled lamp, which has done so much harm to the gas lighting industry, particularly the industrial section; and it would doubtless give you unbounded joy to be able to prove that the higher wattage gasfilled lamps are not more efficient than metal filament lamps. But you know very well that the opposite is the case; and I resent the misstatement of fact with which I am credited.

I endorse some of your remarks under "Memoranda"—particularly as to the futility of deriding gas. It is little use to deride this decreasingly popular commodity; but it has rather to be endured—at least, that is how I regard the matter, as one whose private house is lighted by gas (not from choice).

Your suggested alternative designation for the "gasfilled" lamp—viz., "Optic-Destroyer Lamp" is impossible, as, in the interests of veracity, we must be a little more accurate. Rather let it be termed the "*Gas* Destroyer Lamp;" and then perhaps "Meteor" of the "Electrical Times" would not object to the employment of the word gas in such a connection.

E. W. DOREY.

Enfield, Oct. 29, 1920.

[The paragraphs that appeared in the "Electric Supply Memoranda" for Oct. 27 were not based on the letter published in the "Electrical Review" for Sept. 3, but, as distinctly stated, on an article published in the "Manchester Guardian." The statements in these paragraphs are largely Mr. Dorey's own, and so are the tabulated figures. We ask readers to study the figures (some of which run over "gasfilled" lamps ranging from 60 watts to 1500 watts) in conjunction with the foregoing letter. They are highly instructive statements and figures; and readers will see sufficient in them to make it totally unnecessary for us to reply to Mr. Dorey, or to put up any defence whatever—even in regard to industrial lighting by "gasfilled" lamps. As to a suitable name for the "gasfilled" lamp, our correspondent, of course, knows all about the relative intrinsic brilliancy of lights, and the effect upon the optic organs of lamps of high intrinsic brilliancy. It is wonderful where all the increased demand for gas comes from after dusk, if the gas-filled lamp is having such a fearfully wearing effect upon the use of gas for lighting; and as to gas being "a decreasingly popular commodity," where are the considerable increases in the gas business coming from? Facts are stubborn things. In Mr. Dorey we thought an electrical man had been found who was out for the truth, and who was a champion of facts. But apparently, so far as the gas business is concerned, he is like many others we have come across—he prefers to put unpleasant facts altogether on one side, and finds comfort in a little self-deception.—ED. G.J.]

Restricted Supply at Portmadoc.—Owing to the shortage of coal in South Carnarvonshire, farmers have resorted to the old custom of using peat as fuel. The Portmadoc Urban District Council have decided that no gas shall be supplied for use in places of worship, billiard halls, or any recreation rooms and places of amusement.

Price of Gas at Stourbridge.—It has been decided by the Stourbridge Town Council, on the recommendation of the Gas Supply Committee, that the price of gas for lighting and power purposes be increased to consumers from the commencement of the present quarter by 6d. per 1000 c.ft. The prices will be: For lighting, 4s. 8d. per 1000 c.ft.; for power, 4s. 6d., 4s. 3d., and 4s.

PARLIAMENTARY INTELLIGENCE.

Parliament re-assembled, after the summer adjournment, on Tuesday, Oct. 12.

HOUSE OF LORDS.

Progress of Bills.

The Inverness Water and Gas Provisional Order Bill was read the third time, according to order, and passed.

HOUSE OF COMMONS.

Public Utility Companies (Capital Issues) Act.

Copies were presented of reports on applications to the Board of Trade under the Public Utility Companies (Capital Issues) Act, by the Bedford Gas Light Company, the Newport (I.W.) Gas Company, the Leyland Gas Company, the Wenford Gas Consumers' Company, Ltd., the Tunbridge Wells Gas Company, the Dunstable Gas and Water Company, the City of Waterford Gas Company, the Reading Gas Company, the Scarborough Gas Company, the Crowborough District Gas Company, the Ilford Gas Company, the Colchester Gas Company, and the Great Yarmouth Gas Company.

"Natalite" Motor Fuel.

The CHANCELLOR of the EXCHEQUER, replying to a question put to him by Mr. C. Jesson, stated that an alcoholic mixture called "Natalite" had been in use in South Africa as a motor fuel; but he had no information as to its price in relation to that of petrol. Natalite, irrespective of the denaturant used, might only be imported into this country subject to payment of duty, as in the case of other spirit mixtures; but plain spirits might be imported for use duty free as a source of power, provided the differential duty had been paid and on condition that, after importation, the spirits were denaturated as power methylated spirits, in a manner approved by the Commissioners of Customs and Excise. The question of denaturants to be prescribed for this description of methylated spirits was under consideration.

Motor Fuel.

Sir J. D. REES asked the President of the Board of Trade what action had been taken, or was contemplated, upon the report on motor fuel prepared by a Select Committee appointed by the Standing Committee on the Investigation of Prices which was received by the Government as long ago as last February.

Sir P. LLOYD-GREAME, who replied, said that detailed inquiries were being pursued by an officer attached to the Fuel Research Board as to the possibility of fostering the production of power alcohol, and an interim report by the Fuel Research Board on the subject has been published recently. Provisions with the same object had been included in section 11 of the Finance Act, 1920. As previously explained, the Government did not see their way to take any action in the direction of fixing prices in view of our almost complete dependence on foreign sources of supply.

Boundary Extension Schemes and Costly Inquiries.

Dr. ADDISON (the Minister of Health), in the course of his replies to several questions addressed to him dealing with boundary extension schemes of such magnitude as those of Leeds and Bradford, said he was not prepared to defer any inquiry until a Royal Commission or a Joint Select Committee had been appointed and reported on the whole question of Government areas. He was well aware there was strong feeling aroused by these extension schemes: and entirely agreed that there was gross waste of money in these inquiries. The Act of Parliament required that the inquiries should be held in certain circumstances; and if those circumstances arose, he had no option but to hold an inquiry. It would be a useful thing if the Councils concerned would not rush into the cost of employing expensive counsel and expert witnesses. He was doing all he could to induce authorities to avoid incurring these great costs. If he could prevent them he would; but he had no power to do so.

Municipal Trading Experience at Mexborough.

Discussing, in connection with the fixing of the rates, the financial position of the Mexborough Urban District Council, Mr. W. Winstanley (the Chairman of the Finance Committee) said the water-works were purchased by arbitration from a local Company 7½ years ago; £19,500 being given for a decrepit plant, the bulk of which has been scrapped and replaced. The legal and other expenses of acquiring the undertaking amounted to £10,000, or sixpence for every shilling given for the property. There has been a steady deficit on the working of the undertaking ever since it was acquired; and this deficit now amounts to £3600 a year. To wipe off the accumulated debt, £18,000—nearly the original cost of the property—has been appropriated from the rates in three half-years. The history of the Swinton gas undertaking, jointly purchased ten years ago (also by arbitration) by the Swinton and Mexborough Councils, is, Mr. Winstanley says, scarcely less unfortunate; the concern being tremendously over-capitalized. The capital expenditure is £86,000; and the property is not, intrinsically, worth more than half this sum. Sinking fund charges alone amount to 3s. 6d. per 1000 c.ft.; and though the plant is in normal times disused, and crude gas is taken from neighbouring colliery coke-ovens, the concern is only self-supporting with a selling price of 6s., which precludes any possibility of a commercial development of the undertaking in face of the competition of electricity. The original misfortune of an absurdly high selling price has been aggravated by the calling-in of loans and mortgages, which have had to be renewed at a severely increased rate of interest. Mr. Winstanley states that there is no prospect of a "decent price" being charged for gas in the next ten years.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

The Annual General Meeting of the Association was held last Thursday, at Caxton Hall, Westminster—Mr. H. E. JONES in the chair. In addition to the Chairman, the representatives present (as their names appeared in the attendance book) were: Mr. C. F. Botley, Mr. R. Bruce Anderson, Mr. George Andrews, Mr. H. A. Stibbs, Mr. G. H. S. Iorns, Mr. George Clarry, Mr. T. H. Hazell, Mr. R. W. Edwards, Dr. C. Carpenter, Mr. R. Halkett, Mr. D. H. Helps, Mr. J. Ferguson Bell, and Mr. R. J. Auckland.

The SECRETARY (Mr. F. E. Cooper) read the notice convening the meeting, and the minutes of the last meeting, which were confirmed.

REPORT OF THE COMMITTEE.

The report of the Committee for the year to Sept. 30 was then presented as follows:

Accounts.—The ascertained expenditure amounted to £812. The revenue was: Subscriptions, £487 6s. 1d.; income-tax refunded, £14 14s. 3d.; interest on war loan, £195 1s. 6d.—amounting together to £697 1s. 10d.; leaving a deficit for the year of £115 7s. 4d. From the balance-sheet it will be seen that the assets amount to £4409 3s. 10d., consisting of £4635 10s. 5d. 5 p.ct. War Loan, 1929-1947, at cost, £4404 14s. 5d., and cash in hand £4 9s. 5d. From this total must be deducted the amounts owing to the bankers—viz., temporary loan £2925 and £91 5s. 2d. overdraft on current account—amounting together to £3016 5s. 2d. Since Sept. 30, the sum of £6 6s. has been received in respect of outstanding subscriptions.

Income-Tax Deduction.—The Income-Tax Sub-Committee have had under consideration Form F.A. 6, forwarded to the Gas Companies by H.M. Inspectors of Taxes with reference to claims to be made under the provisions of section 18 of the Finance Act, 1919. As it appeared that inspectors of taxes took diverse views of the effect of the said section—some holding that the one-sixth deduction to be allowed thereunder is in addition to the ordinary allowance in respect of repairs and maintenance, and others that the said allowance is in substitution thereof—the Sub-Committee communicated with Mr. E. Stanford London, C.B.E., the Deputy Chief Inspector of Taxes, upon the matter. They were informed by him that the allowance in question does not in any way affect the right to charge as an expense the ordinary cost of repairs and maintenance in so far as the same would otherwise be allowable. The members of the Association were informed by circular of Mr. Stanford London's intimation; also the allowance in question should be made in respect of buildings, even though not enclosing machinery, where such buildings are in the nature of stores, warehouses, or administrative offices ancillary to and forming part of gas-works. Subsequently, further queries having arisen in regard to the correct interpretation of the section, the Income Tax Sub-Committee had a further consultation and correspondence with the Somerset House Authorities upon the matter; and ultimately a further circular-letter, which had been approved by the Board of Inland Revenue, was sent out to members, setting out the buildings which would be regarded as coming within the provisions of the Act, the mode in which the annual value thereof should be ascertained, &c.

The Income-Tax Sub-Committee have also had interviews and correspondence with Mr. Stanford London with reference to the continuation for a further period of the special allowance referred to in the last report for depreciation of gasholders, meters, and stoves.

The Coal Rebate.—The Committee considered the question of the proposed reduction in the price of gas used for domestic purposes consequent upon the ear-marked rebate of 10s. in the price of coal converted into gas, and decided to send a communication to the Board of Trade strongly objecting to the proposal on the ground that it left the sliding-scale to be controlled by the provision of a very small proportion of the gas sold.

Bills in Parliament.—The interests of gas companies especially have called for careful watching in connection with four Bills promoted in the past session. They are the Gas Regulation Bill, the Public Utility Companies (Capital Issues) Bill, the Finance Bill, and the Great Northern Railway Bill; and in each of them the Association may fairly claim to have successfully represented the interests which the Association was founded to safeguard.

Taking them in the order mentioned, the Executive Committee have had many meetings in connection with the Gas Regulation Bill, and drew-up various amendments particularly in the interests of provincial companies, some of which have found their way into the Act in its final form. As showing the necessity for constant vigilance, one point in particular might be mentioned. At the very last stage at which amendments could be proposed—the report stage in the second House—the Association's Parliamentary Agents discovered that amendments were to be proposed which would have empowered the Board of Trade to grant special Orders under section 10 of the Act to local authorities to establish gas undertakings in competition with existing gas companies. Representations were made to the Board of Trade, to the Lord Chairman of Committees of the House of Lords, and to various Peers, on the subject. The importance of the point raised was appreciated; and the power was eventually modified to the innocuous form in which it now appears in section 10, sub-section (2) (*c*).

With regard to the Public Utility Companies (Capital Issues) Act, 1920, here again important amendments were secured as the result of the action taken by the Association; and the attention of small companies especially is directed to the present form of sub-section (A) of section 1, and the proviso, which latter was inserted after considerable objection in Committee at the instance of the Association.

The Committee felt that, even in the modified form of sub-section (A), the possible failure to place capital with the Company might, and in many cases would, be disastrous to small companies; and, in spite of opposition, power was given to the Board of Trade to dispense with any of the conditions imposed by this section. The Committee would have liked the relief to apply to companies requiring to issue considerably more than £20,000. But that amount was inserted as a compromise; and no doubt there are some companies who will be able to finance themselves from time to time by limiting their issue to £20,000 (so long as existing conditions continue), and so obtain through the Board of Trade more freedom in placing their capital where the circumstances justify it. An important provision was also inserted at the instance of the Executive Committee in section 3 of the schedule to the Act. That provision enables any Company, during a period of ten years from the creation and issue of the preference or debenture stock referred to in the schedule, to redeem out of revenue to an amount to be approved by the Board of Trade any such stock created and issued for the purpose of defraying abnormal reparation expenditure due to circumstances arising out of the war. As every Company has been subjected to

this abnormal expenditure, there may possibly be a considerable number of companies desirous of availing themselves of the benefit of this provision and able to do so.

With regard to the Finance Act, representations were made to the Chancellor of the Exchequer as to the unfairness of imposing the Corporation Tax on public utility companies limited in respect of selling prices and dividends. It is satisfactory to record that Public Utility Companies are exempted from the tax for, at any rate, a period of three years.

The Committee desire to take this opportunity of acknowledging the great indebtedness the Association is under to Sir Henry Cowan, M.P., for the important services he rendered in securing the amendments referred to. He gave at all times ungrudgingly his ability, his experience, and his time in furthering the efforts made to secure the amendments referred to; and the Association cannot be too grateful to him.

A Bill promoted by the Great Northern Railway was considered by the Committee. Under clause 47 of the Bill, it was proposed to empower the Railway Company to convey (*inter alia*) gas from one gas undertakers' district for use within another undertakers' limits of supply. The attention of Companies who would be affected by the clause was called to the provision; and it was suggested that they should petition against the Bill. The Association also petitioned against it. Negotiations for a settlement took place between the Association and the Railway Company; and ultimately the clause was amended so as to apply to water only, and that only with the consent of the water authority in whose district it was proposed to supply water from an area beyond such district.

Reinforced Concrete Roads.—A Sub-Committee appointed to consider the question of making-up roads with reinforced concrete came to the conclusion that local authorities, as the law now stands, were entitled to make-up roads with reinforced concrete, and recommended that if and when any Bill be introduced into Parliament for the consolidation and amendment of the Gas-Works Clauses Acts, 1847 and 1871, the matter should be further considered with a view to seeing whether any provision could be inserted in such Bill giving protection to gas companies in cases where reinforced concrete was employed in road making.

Miscellaneous Matters.—In addition to heavy correspondence with members and advice to them on the matters referred to above, the Secretary has been asked for, and has given, advice upon the following, among other subjects: Borrowing on mortgage; arrears of gas-rent; right of joint shareholders to vote at meetings; raising new capital; failure of gas supply; raising meter-rents; power to issue stock below par; insurance of profits by company; workmen's compensation; Unemployment Insurance Bill; acquisition of a neighbouring gas undertaking; increased rents for cookers and gas-fires; sale of coke by hawkers; railway sidings, increased charges; income-tax borne by companies on emoluments of directors and other officials; liability for damage caused by explosion at works; increase in wages; liability of Coal Controller for diversion of coal supply; shortage of cash in slot meters; Government grant for approved houses; disposal of effluent from gas-works; supply of gas by consumer to sub-tenants; corporation profits tax.

Committee.—The following members retire from the Committee in accordance with Rule 12: Mr. H. E. Jones, Mr. Charles Carpenter, D.Sc., Mr. J. Ferguson Bell, Mr. C. F. Botley, Mr. A. A. Johnston, and Mr. H. A. Stibbs, all of whom offer themselves for re-election.

The Late Mr. R. O. Paterson.

The CHAIRMAN said, before moving the adoption of the report, he should like to say with what concern he learned the other day of the decease of their friend Mr. R. O. Paterson, formerly of Cheltenham, and one of the fathers of the gas profession. He (Mr. Jones) knew him for more years than most people, and always found in him a cordial, scientific, helpful colleague on all points at which they came in contact. His sons occupied positions in the profession, and long might that be so. They were educated, scientific, talented engineers. He thought that they owed the late Mr. Paterson their sincere thanks for bringing such useful helps into the world, and for training them in the profession of which they all thought so much. He moved that they convey to Mrs. Paterson and the family the sympathy of the members in their bereavement.

There was immediate concurrence with the suggestion.

Income-Tax Sub-Committee's Work.

The CHAIRMAN said the next business was to move the adoption of the report and accounts. The report was long; the accounts were simple. The report was long because the work of the Association had covered much ground. The accounts were much on the lines of previous ones; and he failed to discover any item differing materially in amount from past practice. As to the report submitted, he should deal with it very much in the same way; leaving for discussion any points that might strike the members as needing special attention. But he could not pass by the report without recognizing the signal service rendered to the Association and to the industry by the Sub-Committee who had been dealing with all income-tax questions. They had rendered valuable and useful service; and they had so far established a position which was important in these days of gross excess profits taxation, which had not arisen in their companies by a very long way; but should a case ever arise, it was important to have the foundations laid, and the whole scheme settled upon a basis which was so eminently just and fair. In this respect they had fulfilled up to the hilt the main object of the Association—by protecting gas undertakings from undue income taxation. The report upon the labours of the Sub-Committee was quite long; and he thought those present would agree with him that their best acknowledgments were due to Mr. Botley and his associates on the Sub-Committee. He hoped the Sub-Committee would continue to render the valuable aid to the Association which they had so signally accomplished in the past year and the year before that.

Parliamentary Matters.

The Association had been watching certain Bills—the Gas Regulation Bill among them. In this connection, he should like to recognize that their Parliamentary Agents (Messrs. R. W. Cooper and Sons) were present in the Committee room during the whole of the discussion upon the Bill, and watched the proceedings very carefully and strenuously, and, he thought, very serviceably. Then it would be seen that the general operation of the Executive Committee had been one of careful and continued vigilance on all points or subjects which the Government approached and which affected gas undertakings, but which the Government imperfectly understood, and so had to learn from the Association, although they did not consult them before they started. They would probably learn in time that they could get information from the proper quarter, if they chose to apply for it. The report dealt at considerable length with these matters—matters furnishing motives for action on the part of the Association; and he thought he might say the Association in all these particulars had fulfilled its mission adequately, properly, and fully. The report concluded with a reference to some of those (what he liked to call) "thousand-and-one" points and subjects on which the smaller companies found their Secretary so very helpful in laying-down rules for their guidance on technical and legal matters which were common in the experience of those dealing with large businesses and many interests, but which were not so common to the smaller companies.

Conservation of Personal Energy.

With regard to the election of the retiring members of the Committee he wanted to say something quite plainly, and (he was thankful to say) not on account of weakness or even of approaching old age. It was this. If they re-elected him (the Chairman) they must be content with occasional attendance at the Committee meetings; and, if he might so call it, he must take the part of a chamber counsel. It was due to himself now not to take on too many additional duties. He accepted at its start the presidency of the National Gas Council. He was glad he did so; but it was too much. He had the practical, anxious conduct of a considerable number of gas companies at home and abroad; and he really did not know how far one could stretch the limits of one's constitution in undertaking work outside that for which one felt distinctly responsible—having undertaken to watch over the interests of shareholders. Therefore, he warned them that they must not ask him for this additional duty; and it would not be fair even if he allowed them to think that he might again occupy the rostrum. He should be quite content to attend Committee meetings if at any time any subject arose upon which their Secretary thought it necessary to summon him. But he could not undertake to work in the future as in the past. Indeed, his sense of what was due to himself in regard to recreation and rest made it out of the question. Therefore, he asked them not to re-elect him with the idea that he was going to be a working horse in the team. But he should like to continue to be identified with the Association in some position, because he regarded the Association as almost a trust handed over to him by his great friend and predecessor in the chair—Sir George Livesey. Knowing what lines he took to gain liberation for the industry, and knowing the main invaluable services he bestowed upon the industry, he (the Chairman) felt that all of them could not but be grateful to him; and he personally would not like to abandon any trust that he put into his hands, as he did when he asked him privately before recommending him to the vote of the members whether he would take the chair of the Association.

A Glance Backwards.

The Association was not a conspicuous body; it was not a wealthy body; and it could not compare its finance with the enormous fees that were collected through Associations largely connected with trading. They were interested in the politics that came to industry, as reflected in Acts of Parliament, and in protecting gas companies from any sort of attack. They were far away the seniors of the great mushroom and rapidly growing Associations that had sprung-up the last few years. The Association ante-dated them by many years; and it had the respect due to the fact that it took care of the interests of the industry very many years before these other Associations were born or dreamed of. The Association could not be deprived of that. It did an immense amount of pioneer work, and fought the question of sulphur, illuminating power, and other matters in Parliament and before the Board of Trade, and, with scientific advisers, effected very fine work. It was doing very good work still. Therefore the Association ought to be appreciated by the gas companies, because of the services rendered when there was no other body to help. Unfortunately, owing to the fact that by their constitution they could not include municipal undertakings (which had multiplied and become very influential), and because many of the smaller companies had been so short-sighted as not to join them in spite of frequent applications, the Association was not so wide nor so rich as it ought to be. But it had its special mission. That mission was the policy of gas administration as reflected in Acts of Parliament, and the preservation of the industry from unnecessary trammels.

United Organization and Effort among Gas Companies.

Dr. CHARLES CARPENTER (Vice-Chairman) had much pleasure in seconding the adoption of the report. He could not but think the members would be exceedingly heartened by the encouraging expressions they had heard from the Chairman with regard to his helping on this work still, because they could not shut their eyes to the fact that their Chairman was almost the only active representative of the industry whose association dated back a very great number of years. Mr. Jones had had a unique experience in engineering matters (particularly gas), in rating matters, and in everything appertaining to the politics of gas supply. Every member of the Association would welcome the promise that he thought the Chairman had made, that, although they would have to look forward to having his less constant attendance at the Committee meetings, yet, when they more especially required or desired the advantage of his counsel and wisdom, it was quite certain they might look forward to receiving it. The position the Association occupied was, as the Chairman had pointed out, unique in more ways than one; but they wanted to remember throughout in regard to it, that it was the only Association that had had specifically under its care, so far as he could understand, gas companies as distinct from gas undertakings. It was quite true the lead and work it had given had had valuable effect upon the industry as a whole. But it specially existed for the protection of gas companies, and therefore of those thousands of shareholders, most of whom were unable to help themselves, who had invested their money in the business of gas supply. There was another point with regard to industries or undertakings such as their own—they could not exist by themselves. The progress of one affected more or less—sometimes slowly, sometimes a great deal—the progress of all the others; and, if the contrary happened, it was also true that it had its effect in a very wide circle. If those people who lived in one area continually lived in that area, and got their gas supply only from that area, what he had said would not be incorrect. But supposing a person moved

from town A who was prejudiced against the gas there, and moved into town B, town B had got to set to work to educate him, and suffered a handicap by reason of the consumer being prejudiced by his use of gas in town A. So the fact remained that they were all very much dependent upon one another; and the importance of working together for their future was at least as paramount as in many other industries. In fact, he thought there were very few indeed in which it was so important. This was his excuse for having in the past given attention to the affairs of the Association—attention which he hoped to have the opportunity of continuing in the future, and especially now that the six weary years since August, 1914, had passed away. To put it another way. It was important in respect of the particular company or companies in which he (Dr. Carpenter) was concerned, that anything he might learn, or anything he might know, or any advice he might give that was helpful, was in the long run going to help those companies too. No undertaking could be disassociated from the general weal and general progress. That sentiment was one which ought to animate the whole of the industry, especially those who represented gas companies as distinct from gas undertakings. It was not quite the same thing in a municipality. A municipality had a gas committee looking after the gas-works, and an electricity committee looking after the electricity works; and he could understand those owners not caring a button which undertaking progressed. The interests of gas companies were bound-up in quite a different way; and it was the gas companies who were fighting the battle which was growing more and more keen and more and more difficult every day. This was another reason why he thought gas companies should associate themselves together to the fullest possible extent. They had in the past cleared away some difficult problems; but it was not at all likely that they had wiped them all out for the future. In all probability, they would have as many problems to deal with in the future as in the past. He thought (if he might say so) that the Chairman had spoken of the Association being a modest one. He did not think it suffered from that. He thought it an advantage not to be on too large a scale, and to rely rather upon the personal effort and personal interest of the members than upon wide publicity in the daily press. There were a great many things that they could do best if they talked about them themselves than if they spread the knowledge broadcast. In all his connection with the Association this fact had always impressed itself upon him—the earnestness, the thoughtfulness, the ability, the acumen with which those who were associated with the Sub-Committees had attacked the various problems that had come under their notice. The Chairman had referred to this; and he (Dr. Carpenter) thought that those who were responsible for the conduct of gas companies, if they would read carefully the report of the Committee and of these proceedings, would respond to their Chairman's appeal, and realize their bounden duty to join the Association.

PARLIAMENTARY WORK.

Mr. R. W. EDWARDS (Aldershot) said it would be no exaggeration to say that the last twelve months had been the most notable of recent years. He had belonged to the Committee of the Association for several years, and he did not remember such a multiplicity of important events as during the past twelve months. One thing that had been brought home to all those who were members of the Association was that it was of special importance to gas companies. He would illustrate it in this particular way: As all knew, the Gas Regulation Bill required close attention. He had the bonour to serve on the Special Committee of the National Gas Council and on the Executive Committee of this Association as well; and he knew that in one point that arose in the Bill, this Association rendered tremendous assistance to the gas companies of the United Kingdom. It was in regard to the point which would have empowered the Board of Trade to grant Special Orders under section 10 of the Act to local authorities to establish gas undertakings in competition with existing gas companies. It was due to the persistence of the Association Committee, with their Parliamentary Agents, that they were able to get this particular provision modified. If there was any *kudos* for the amendment secured, it was due to the Association. In this amendment they justified themselves as an Association. One other point he ventured to suggest had escaped notice; and one which he thought, and they all felt at the time, was a great stride in gas administration. That was the Public Utility Companies (Capital Issues) Act. Great efforts were made by the Association to get freedom. They got the freedom; and it was established to-day in the Act. It was time the Board of Trade introduced certain amendments; but notwithstanding they were, under the Act, free from the auction clauses for many years. The Association also obtained the capital redemption clause, under which they could redeem from revenue; and it was only by tactful work they got it. Another matter over which they worked hard was with regard to the Finance Bill, in which freedom was obtained from the corporation tax for at any rate three years. He did not want it to go forth that the Association claimed the entire credit for this. They did not. But they did consider they did a large amount of work towards securing the concession. It was hoped the Government would at the end of the three years continue the concession, as the tax was manifestly an unfair one upon statutory gas companies. The Great Northern Railway Bill raised a very important point, as seen by the report. Immediately the Committee became cognizant of this, they did not rest until it had been amended in the form in which it appeared in the Act. As to the use of reinforced concrete for road making, he suggested that those who were face to face with the problem should keep in touch with the Committee. Notwithstanding the fact that there were no statutory provisions protecting gas companies in this regard, he thought something to protect them should be put into any Bill dealing with the subject. Throughout the whole of this work the Committee had had the loyal support of the Parliamentary Agents of the Association—particularly Mr. Campbell Cooper, who had devoted himself unselfishly to it. He was sure the Association appreciated his efforts. They were also deeply indebted to Sir Henry Cowan. He threw himself into these problems, and did not spare himself in any respect. The Association were under a deep debt of gratitude to him. There was one other point. For some years most of them had worked under the chairmanship of Mr. Jones. The words that he had used in his remarks upon the report and accounts reminded them that the time came when work sometimes took from them more than they could safely give. They had heard their Chairman's words with great regret; but they all hoped he would retain a seat on the Committee. They had only just started on their work under the Gas Regulation Act, which gave them power to obtain not only the Orders provided for under section 1, but Special Orders. He ventured to suggest that, in view of this, the value of the Association would become more and more important to gas companies when they realized what they could obtain under the Act. In conclusion, he hoped that Mr. Jones would enjoy good health and strength for many years to come.

The CHAIRMAN remarked that he was obliged to Mr. Edwards for having reminded him that he had omitted (although he had made a note of it) to refer to the eminent services in Parliament of Sir Henry Cowan to the gas industry. He could only say that they did all feel their great indebtedness to him for his valuable assistance. He also heard with great pleasure the reference to the unfailing attention of their Parliamentary Agent, Mr. Cooper.

RE-ELECTIONS.

On the motion of the CHAIRMAN, seconded by Mr. GEORGE CLARRY (Cardiff), Sir J. Fortescue Flannery, Bart., M.P., was re-elected President.

The CHAIRMAN moved that Mr. Charles Hunt be re-elected Vice-President. "We old fellows like these little compliments," he remarked; and he thought Mr. Hunt richly deserved this one. He had rendered yeoman service to the industry.

Mr. C. F. BOTLEY (Hastings) seconded the motion.

Moved by Mr. EDWARDS, and seconded by Mr. BOTLEY, the Chairman was also re elected a Vice-President.

Proposed by Mr. EDWARDS, and seconded by Mr. T. H. HAZELL (Newport, Mon.), the retiring members of the Committee, as named in the report, were re-elected *en bloc.*

The Hon. Auditor (Mr. W. A. Scott, F.C.A.) was also re-appointed.

UNEMPLOYMENT INSURANCE.

The CHAIRMAN intimated that Mr. D. H. Helps had a matter regarding unemployment insurance to bring to the notice of the members. It was a matter which might be referred to the Committee, if thought desirable.

Mr. D. H. HELPS (Reading) said he should like to say a word on the subject of whether gas companies should apply for exemption under the Unemployment Insurance Act. Personally, he had advised his Company that it would be paying too high a price, with guaranteed continuous employment to their men, in order to gain exemption. They would not do so. The work was so continuous that an injustice was really done in asking them to pay the same insurance as those employers whose people were subject to constant dismissal. The previous night a member of the Reading Chamber of Commerce called his attention to an application which had been received by the London Associated Chambers of Commerce from the National Federation of Employees' Approved Societies. It was a very long statement; but he thought, if he read what Mr. Locker Lampson, M.P., said in the House when the Bill was under discussion in July last, it would perhaps explain the matter. He said:

> A Committee has been appointed by the Government, and is now sitting, to inquire whether labour exchanges are to go out or not. Under the Bill a person is able to obtain his unemployment benefit through a labour exchange. If the Committee agree that, in the interests of the State, labour exchanges had better be abolished, and if you also do not allow friendly societies to administer the unemployment benefit, then trade unions will be the sole persons to administer unemployment benefit in the country. The whole of the employed population will have to take their unemployment benefit (unless they happen to contract-out) through the trade unions, and through the trade unions alone.

In the statement of Mr. Henry Lesser, the President of the National Federation of Employees' Approved Societies, which he submitted to the Associated Chambers of Commerce, he said:

> If the Association of the Chambers of Commerce can see its way to co-operate with the Federation in the manner suggested, the greatest benefit would result to the Employers' Societies. These Societies stand for the promotion of goodwill among workpeople, They represent the human factor in the link between employer and employed; and if through the force of circumstances they are to be sacrificed to the trade unions, and other public bodies, much that enlightened employers have done during a great number of years to make for pleasant relations with their workpeople would have completely failed.

What the Federation was asking was that Chambers of Commerce in different towns should receive from employers notifications as to vacancies and transmit them to the employees' approved society in their locality. The Federation would quite willingly pay the expenses incurred in sending up information. He hoped any members in touch with local Chambers of Commerce would support the recommendations of the London Chamber, and get them to agree to receive and transmit the information to the approved societies as desired.

Dr. CARPENTER [who took the chair at this stage] said there was the fact, as Mr. Locker Lampson pointed out, that they were liable to have this state of things existing—that all the work might be done solely through the medium of organizations whose attitude unfortunately was not generally sympathetic towards employers of labour. They could at any rate look forward to the Chambers of Commerce to help in establishing in this matter a proper position in industry. They could—both sides—depend upon them being impartial. He supported Mr. Helps's appeal.

Mr. EDWARDS said a great many public utility companies were under the impression that, if they obtained a certificate of exemption, they were doing the right thing. But on examination of the provisions and rules, they were coming to a different conclusion. When a man obtained a certificate of exemption on their application, he obtained a legal instrument, and one they ought to be careful about obtaining. If a man was willing to obtain a certificate of exemption on his own account, they could not disagree with that. At any rate, they as gas companies ought not to expose themselves to legal liability. He thought he was right in saying that a certificate of exemption only exempted the man, and not the undertaking.

Dr. CARPENTER observed that, of course, if they altered their minds later on, they could do so, even if they agreed to this now.

Mr. J. FERGUSON BELL (Derby) also thought that at the present time it would be unwise for any undertaking to contract-out under the Act. It was also desirable that provincial undertakings should get into communication with their local Chambers of Commerce, and support the London Chambers in the matter raised by Mr. Helps.

Dr. CARPENTER said what they wanted was that the report of these remarks should bring the subject raised generally into the minds of those responsible for the conduct of gas undertakings, and to suggest to their members that they should communicate with the Committee of the Association for advice and counsel.

VOTE OF THANKS TO MR. JONES.

Moved by Mr. EDWARDS, and seconded by Mr. GEORGE ANDREWS (Swansea), the members placed on record their high appreciation of the services of Mr. Jones as Chairman for many years.

CO-PARTNERSHIP IN PRODUCTION AND DISTRIBUTION.

Under the auspices of the Labour Co-Partnership Association, there was held last week, on Tuesday and the two following days, at the Royal Society of Arts, a Labour Co-Partnership Congress, at which various aspects of the question were very fully discussed.

On the opening day there was a luncheon at the Hotel Cecil, at which the speakers included the Marquis of Salisbury. Mr. Aneurin Williams, M.P. (Joint Hon. Secretary of the Association), appealed for financial support, and mentioned that the South Suburban Gas Company had sent a donation of £50 to the Association. Mr. Charles Hunt (the Chairman) pointed out that the South Suburban Company adopted the principle of co-partnership many years ago; and he said he could speak with confidence as to the efficiency of the system. They had two Employee Directors, who were real Directors. They were "part and parcel" of the Board; and nothing was discussed without their presence. The moral of his experience was: "Trust the workmen, and they will not betray you. Give confidence to them, and they will have confidence in you."

LEGISLATION CALLED FOR.

When the congress assembled on Wednesday morning, it was resolved: "That, in the opinion of this congress, all possible means should be taken to advance the adoption of co-partnership in industry, and in particular it recommends: (1) That legislation should be immediately passed removing from all statutory and other companies any legal obstacles that may exist in the way of its adoption. (2) That a special department of the Board of Trade or the Ministries of Labour and Agriculture should be constituted, to study the practical aspects of the question in connection with the various industries of the country, so that, where opportunity offers, recommendations can be made for the best scheme of co-partnership to be adopted in any particular case. (3) That a committee consisting of persons conversant with the trade union movement be appointed by the Labour Co-Partnership Association to consider what steps should be taken in the adoption of any co-partnership scheme to secure the hearty co-operation of trade unionists."

Lord EMMOTT, G.C.M.G., G.B.E., said he was convinced that co-partnership—including, of course, profit-sharing—was the right solution of some of the ills from which the world was at present suffering. No scheme of nationalization in any democratic country had proved itself successful in competition with undertakings carried on under private enterprise. For the general welfare, three things were necessary—incentive to work, reward for efficiency, and the encouragement of saving. Under profit-sharing and co-partnership, there was the incentive to work and to strive for efficiency. But if they were to have profit-sharing, he thought that employers would have to make up their minds to give a bigger share of the profits to the worker. What he meant was that when profits were made over the agreed datum-line which was to give a reasonable return as interest on capital, a larger share of the surplus than under many of the present schemes should go to the workers. Here the question of saving came in as the crucial part of the whole matter. He wanted to see the worker become the capitalist. If, in the long run, he ousted the present capitalists, so much the better. Their problems would then be solved.

AN ADDRESS BY DR. CHARLES CARPENTER.

Dr. CHARLES CARPENTER, who followed, said it was a great pleasure to him to accept the invitation of the Association to address the congress. Particularly did he feel it so after reading some of the utterances on this very important subject which had lately appeared in the Press. He had come to try to make clear to them that all this talk of co-partnership was not visionary, as some people would have them believe. He had come to explain co-partnership as they practised it in the South Metropolitan Gas Company, in precisely the same way as he might have come to explain about the particular work and resources of their research and physical laboratories or their workshops, or how their special requirements were met by the carbonizing plant. Co-partnership was just as integral a part of their business as the laboratories, workshops, and carbonizing plant; and it was from this point of view that he proposed to deal shortly with the matter. Co-partnership as his Company practised it was initiated something like thirty years ago, by the late Sir George Livesey, who had long had it in his mind to endeavour by some such means to obtain the confidence and sympathy of the workpeople. It could not be said that their employees were dissatisfied, any more than was the case with workers generally; but Sir George at that time did not feel that he could depend upon their working for the interests of the undertaking in the same way that he could depend upon the efforts of the responsible staff. He therefore proposed his scheme of co-partnership, at which unfortunately the union took umbrage, and there was a strike, with results well-known to them. For a time the proposals of the Company were so to speak under a cloud, because it was suggested the idea of Sir George was to weaken the power of the union. Such a thing never entered into his mind at all. So they went on for some years; and the principle proved its advantage to the undertaking when comparison was made of their working results with those of their neighbours. The Company were able at that time, and were for some years (while the conditions of working were so near as to make comparisons valuable) able to prove that, as a commercial proposition, the idea of profit-sharing, as it was then called, was well-founded and was accurate.

Then they looked still more deeply into the matter, and became conscious of a desire—which had since found much greater expression—on the part of the workpeople to be associated with the management. They had gone on for some years building-up, not only the co-partnership element, but the saving element. They had a large body of workpeople who had, as a result of saving under co-partnership, accumulated a not inconsiderable share in the capital of the undertaking. So the time was ripe to give practical expression to the desire to which he had referred on the part of the employees to be represented in the management. The adoption of profit-sharing in the beginning, and then of co-partnership, had not excited opposition from the so-called capitalist class; but when it came to the proposal that the management should be shared by the employees, some people were up in arms against what they declared a ridiculous suggestion. However, in the teeth of a great deal of opposition, Sir George Livesey carried his point, and an Act was passed increasing the number of Directors from seven, by the addition of three employees (chosen by ballot) who possessed certain qualifications of service and of saving or stockholding. He believed the qualification of service was fourteen years with the Company; and the qualification of saving was that they must hold £160 of stock. From that day to this the system had been working with every possible advantage both to the employees and to the undertaking. He thought the main advantage of the proposal was that it accepted an ideal for labour. Whether the idea was logical or not was another matter; but it was accepted. Here, again, one found it asked: "Does this state of things really exist, or is it merely something that is talked about?" To show that it really existed, he produced two posters. One set out the result of the latest voting for an Employee Director of the Company. It showed about thirty candidates, and the number of votes each received. As none of the candidates received a clear two-thirds majority, another vote would have to take place to select one of the two candidates at the head of the list to be a Director for the next three years, and sit at the Board of a Company whose nominal capital amounted to something like £9,500,000 sterling, and whose actual worth was considerably more. The second poster set out the qualifications and length of service. The main advantage of having these Directors, he repeated, was that it allayed a great deal of the suspicion that was inherent in the mind of the average worker. Men who felt any doubts as to what took place in the Board Room could go to their representatives and learn the truth.

Dr. Carpenter explained the formation and operation of the Works Committee, and then, to show what the Company are doing now, he went on to refer to the recent Act. He said the preamble set out that the Company were desirous that new provisions should be made with a view of securing that the public supplied by the Company, and those employed in the undertaking, and those providing capital therefor—here were the three parties; another Triple Alliance, if he might use the expression—should be, and that more than heretofore, directly and mutually interested in and advantaged by the development and improvement of the undertaking and the earnings thereof, and the cheapening of the price of gas sold by the Company. It went on that, with a view to secure these objects, provision should be made whereby the profits of the undertaking, after providing for a reasonable return on capital, should be applied as to the greater part in reduction of the price of gas, and as to the balance in part in increasing the return on capital invested in the undertaking and in part by way of bonus to the employee co-partners of the Company. Clause 19 of the Act carried this into effect, by providing that the surplus profits of the Company should in future be divided in the proportions of three-fourths to the consumers and one-fourth equally between the ordinary stockholders and the employee co-partners. Here was the incentive.

Now, what was the effect of all this in practice? It was not at all uncommon to hear the employees say that so-and-so was "not a good co-partner," meaning that in some way he did not give the full value for his money that the really good co-partner thought should be the case. In other words, the good co-partner was a good tonic to others in the maintenance of a high level of working of the undertaking as a whole. With a system of this kind, not only the need for strikes, but even talk of strikes, was eliminated; and this was a great step forward. The system had brought a peace and contentment which would have been, so far as they could see, impracticable of realization in any other known way. The employees had a substantial holding in the stock of the Company, which at the present time amounted to something like £500,000. This did not represent the whole of the money they had taken in bonuses. The saving characteristic did need inculcating in the working classes generally. If it could only be brought home to them that somebody had got to save if industry was to go on, it would be a great thing. If profits were to be transferred from the capitalist to the worker, it was up to him to save, and provide those sinews of war which industry so badly needed.

He hoped he had made clear to them that these ideals were possible of practical application in the interests of the nation as a whole. In support of his case, he knew he could bring the great bulk of the gas consumers of South London. Many would say, if they were asked, that the men seemed to take more interest in their work, and to be better trained, than the average man who came to look after their wants. He would be justified in saying that the verdict of South London on the success of co-partnership might be very easily and very properly applied to the country as a whole.

THE RESOLUTION.

The resolution submitted to the congress, and adopted after discussion, was: "That, in order to harmonize the essential unities of interest between capital and labour, and to break down the present antagonism separating those providing the capital from those providing the labour, and to secure an increasing share of the capital to those supplying the labour, a system of industry must be introduced in which the workers possess a share in the profits, a share in the capital, and a share in the control and responsibility."

GAS PRICES AT STOCKTON-ON-TEES.

Statement by Mr. Matt Dunn.

One of the candidates at the Stockton-on-Tees municipal elections—a member of the Gas Committee—claimed the credit of being largely responsible for the change of policy which led to the reduction in the price of gas to 1s. 6d. per 1000 c.ft., less 15 p.ct. discount. Stockton's claim to the "blue riband" of the gas field was largely referred to during the campaign; and this fact prompted Mr. Matt Dunn (the late Gas Manager, now in practice as a consulting engineer) to make a statement. It was only right, he said, that the exact position should be known, although it would have been better had the Committee or the Council issued the fact. The present reduced price was not due to any reduction or economy in the cost of producing the gas supplied, but to the following facts:

1. The present Manager, by a special resolution, was permitted to sell coke for shipment—a privilege not enjoyed by his predecessors, although repeated overtures were made from time to time, which were looked upon as a violation of Standing Orders, and opposed to the town's interest and welfare.

2. Since my retirement in February last, coke has advanced by leaps and bounds in price for shipment abroad, making in all £12 per ton—due entirely to the demands made upon our markets by clamouring foreign countries, which conditions no man or Council could possibly forecast.

3. Any alert and qualified manager in a similar geographical position to that of Stockton in regard to shipping ports, could, without begging for an order, have achieved the results which have made possible this reduction in the price of gas. Be it understood that the shippers sought the coke at fabulous prices. The alert manager had but to stand out and demand the best possible price, and with such competition could not possibly make any mistake. Furthermore, many-time multiplied prices obtained for tar, pitch, and other products have increased many pounds per ton in the interim, and, in turn, have considerably augmented the means for reduction in the price of gas. Therefore, it is entirely due to the abnormal profits obtained therefrom, and not by any reduced cost of production, that this concession has been made possible.

Mr. Dunn went on to remark that having realized these profiteering prices, the Council had to apply them to useful service. To this end, they reduced the price of gas. Quite good. But could they not have given the gas free, and yet make a good profit—sufficient, at least, to afford relief of rates, if that be deemed a wise procedure? To claim the blue ribaud of the municipal gas-making world, if only for a few weeks, was but another evidence of the reckless desire for notoriety. "As one who has taken a prominent part in all the town's movements," Mr. Dunn asked ratepayers to scrutinize carefully all statements made use of by "certain aspirants for a further three years' service on the Council."

STOCKPORT GAS-WORKS REPORT.

In spite of continual increases in costs of wages, materials, &c., Mr. S. Meunier (the Engineer and Manager) is in the satisfactory position of being able to report to the Stockport Corporation Gas Committee a small profit of £5188 for the year ended March 31 last, instead of, as for the preceding twelve months, a loss of £12,224. He points out that the difficulties in relation to repairs, the closing-down of retorts for varying periods, due to sickness and absenteeism, &c., referred to in the last two or three annual reports, were quite as acute as on previous occasions; while the extended manufacture of carburetted water gas, in order to maintain a reasonable supply to the town, undoubtedly had a serious effect upon the revenue for the year. This compulsory shutting-down of work also rendered necessary the lowering of pressure on numerous occasions, so bringing down the sales of gas to a lower degree than they otherwise would have been. In fact, it was only by the exercise of every possible vigilance that the supplies of gas and coke were maintained within the limits necessary to avoid general complaint among the consumers.

The removal of restrictions on the purchase of meters in March, 1919, and the placing and due execution of orders for new meters, have had the effect anticipated upon the unaccounted-for gas and the number of accounts the consumption on which had to be computed; there being a reduction on this year's return from 10·59 p.ct. to 9·53 p.ct. It is practically certain that this will be again reduced during the present financial year. In addition to the staff engaged upon meter repairs, the services of the various makers were utilized for the same purpose, as it was felt to be absolutely necessary for all defective meters to be changed as rapidly as possible. In all probability it will be found that the major portion, if not all, of the 34,000 meters used in the district, will have to receive attention.

In spite of the reduction of pressure from time to time, there was an increase in gas sold of 69,326,000 c.ft., equal to 9·66 p.ct., over the previous year.

As showing the effect of the increased manufacture of carburetted water gas, oil used increased from 138,121 gallons to 266,212 gallons, and sales of coke dropped from 22,070 to 17,020 tons, while coke used on works rose from 6960 to 8262 tons; but, though the quantity of residuals sold was somewhat less, yet revenue benefited by the higher prices obtained. The average price of coke sold in the year was £1 15s. 7½d. per ton, tar £2 19s. 4½d. per ton (having gradually risen from £2 3s. 8d. in April, 1919, to £5 2s. 10d. in February, 1920), when the tar-distilling plant was put into operation), sulphate of ammonia £21 19s. 4½d. per ton, and benzole 1s. 1d. per gallon. The market in these bye-products is still on the up-grade, especially in tar and its products. The value of tar has advanced from £5 2s. 10d. per ton in April, to an average for the district of £7 11s. 11d. in July, as sold under sliding-scale contracts.

During the year the benefit of the last increase to 5s. per 1000 c.ft., together with the increase in sales of 69,326,000 c.ft., has resulted in an increase in revenue of £47,628. On the expenditure side, coal accounts for an addition of £11,588, and stokers' wages, £5117.

The actual result is that there has been an increase in revenue of £68,670, and an additional expenditure of £49,252, leaving a net increase of balance to profit and loss account of £19,418 over last year. Of this, however, £3085 is the balance carried forward under the Coal (Pit's Mouth) and Prices Order and Direction, 1919.

It is practically impossible to make anything like an accurate forecast for the ensuing year, as increases in wages, shortening of working hours, additional holidays with pay, cost of materials and plant are continually coming forward, and these demands appear likely to continue for some time, while the diminution in the amount of work done per day is marked, not only in the gas, but in other industries. There is, however, no doubt that the new carbonizing plant which is now being installed, and which it is hoped will be brought into use wholly or in part by next February or March, together with other improvements in hand, will materially improve results, and reduce costs; while the steady and regular increase in the value of bye-products will lead to additional revenue being obtained.

GAS FOR HOUSING SCHEMES.

The Question of Initial Cost.

The Housing Committee of the Hammersmith Borough Council reported that for some time past they had under consideration the question of the gas supply to the houses on the Wormholt estate, and had been in communication with the Brentford Gas Company on the subject.

The Company informed them that, unless a substantial proportion of the cost of providing the necessary apparatus and laying mains for the estate was borne by the Council, it was commercially impossible for the Company to undertake the necessary supply. Electricity would be installed in each house; and so far as gas was concerned, it would be required very largely for cooking purposes only. The Company pointed out that the approximate cost of providing for the estate, exclusive of productive plant, would be between £35,000 and £40,000; and they asked the Council to contribute at least half the cost incurred in providing the necessary mains, &c. If the Council were prepared to afford facilities for the more extended use of gas on the estate, the Company intimated that they might be able to modify this proposal to some extent. Legally, under section 11 of the Gas-Works Clauses Act, 1871, the position seemed to be that the Company were under an obligation to furnish a gas supply to premises within 25 yards of the Company's mains; and this the Committee understood the Company were prepared to do. But very few of the houses on the estate would be within 25 yards of one of the Company's mains. In view of the fact that the adoption of the Company's proposal would represent a capital outlay by the Council in connection with the gas services of approximately £11 per house, the Committee decided to invite the Company's Engineer and Manager to discuss the matter. The Company's proposal was accordingly fully discussed; but the Company's Engineer intimated that, while he was prepared to consider alternative propositions mentioned at the meeting, he could not vary the terms on which the Company would be prepared to furnish a supply.

It was also reported at the meeting in question that the Company had decided to suspend supplying cooking-stoves on hire at a fee of 9s. per stove per annum to their customers. Tenants desiring a supply of gas for cooking purposes would therefore have to purchase stoves direct or on the hire-purchase terms. The present price of a stove was about £7 15s.

In view of the large capital expenditure which would have to be provided by the Council if the Gas Company's proposal were adopted, they, after some deliberation, considered the practicability of affording a supply of electricity for cooking purposes. They understood that the mains which would be laid on the estate to supply electricity for lighting purposes would be large enough for supplying a hot-plate or boiling ring in each house, and that for an expenditure appreciably below the proposed outlay for gas supply, a supply of electricity could be given for a cooking range in each house. It would be possible to put into each house a small oven and two boiling rings, complete with the necessary wiring, at a reasonable cost; and this apparatus would do all the work necessary for the provision of meals. In the circumstances, it was decided to request the Electricity Committee to submit an estimate of the cost of furnishing electricity for cooking purposes to between forty and fifty of the houses now nearing completion, in order that this method of supply might be tested; and, subject to the estimate comparing favourably as regards capital expenditure, and generally, with the Gas Company's proposal, the Town Clerk was instructed to submit it to the London Housing Board for their approval, with a view to the early adoption of the proposal now put forward as an experiment.

PRESTON GAS COMPANY'S OFFER.

A meeting of the Housing Committee at Preston was attended by Mr. Simpson (the Tramways Engineer), who reported that the Electric Supply Company would not be able to supply current for at least six months; and even then they could only give a bulk supply at each site—the Committee to put in meters and distribute the current. Mr. Simpson stated that he could give a temporary supply to about a hundred houses at Holme Slack from the tramway power station. Mr. F. J. Newbound (Secretary of the Preston Gas Company) attended, and stated that the Company were prepared to supply a gas-cooker to each house free, and run the necessary pipes. They would also run a pipe for a gas-boiler, to be supplied by the Committee; and if the order for the gas-fire proposed to be fixed in the principal bedroom was placed with the Company, they would run the pipe for such fire free of cost to the Committee.

The Bombay gas strike ended on the 21st. ult., after lasting for twenty days. The strikers have been dismissed; and street lighting has been partially resumed.

TRADE NOTES.

[For "Journal" Advertisers.]

National Benzole Company.

An interesting booklet has just been published by the National Benzole Company, Ltd., of No. 30, Grosvenor Gardens, S.W., in connection with their lubricating oils, which are suitable for all types of engines under all conditions. The object is to give owners of internal combustion engines useful information concerning efficient lubrication; and this is certainly achieved. "N.B.C." lubricants are perfectly pure oils, and are prepared to a standard specification. There are two grades; and a list is given as a guide to the correct grade for use in most cars in summer and winter. The Company also forward a list of garages and retailers where supplies of National Benzole and of "N.B.C." lubricating oils can be obtained. It may also be mentioned that the "Dewar" challenge trophy, presented to the Royal Automobile Club by Lord Dewar in 1904, has been awarded to the Company in respect of the 10,000-mile trial of National Benzole held under the official observation of the "R.A.C."—this being adjudged by the Technical Committee to have been the most meritorious performance of the year in certified trials.

"Regal" Gas-Grates.

Messrs. Arden Hill & Co, of Aston, Birmingham, forward an advance copy of their 1920 winter list, giving particulars of the new "Regal" series of gas-grates. This new series embodies the very latest improvements in modern gas-fire construction; and the grates are throughout interchangeable with the new standardized grates made by the other companies associated with Radiation, Ltd. The designs are excellent from an artistic point of view; and the stoves are fitted with a new noiseless and non-lighting-back burner, regarding which Messrs. Arden Hill say: "Should it be at any time unavoidable to use gas of very low calorific power—even 350 B.Th.U.—this burner will be found still competent to its heating work." They are also fitted with patent "Injector-Ventilator" and "Thermo XX" fire-front. In the dozen designs illustrated sufficient variety is provided to suit all tastes; and there are shown two built-in grates specially designed to meet the requirements of housing schemes.

A Tar-Distilling Combine.

Readers will be interested to hear that Messrs. E. Catchpole & Sons (London), Ltd., of Rotherhithe, and Messrs. Thomas Crow & Sons, Ltd., of Barking—both concerns of over sixty years' standing—have disposed of their tar-distilling businesses to Messrs. Crow, Catchpole, & Co., Ltd., whose head office is at Hart's Lane, Barking. The Managing Directors are Albert A. Catchpole, Fred E. Catchpole, and H. Wilfrid Crow; and it is the intention of the new Board to follow the traditions of their predecessors, which means a continuance of the untiring personal touch that has in the past so characterized the late businesses. The capital is £500,000 in £1 shares—£250,000 of "A" 7½ p.ct. cumulative preference shares, £150,000 of "B" similar shares, and £100,000 of ordinary shares.

Manufacture of Gas-Meters in London.

The Public Control Committee of the London County Council report that Messrs. Alder and Mackay, Ltd., of Edinburgh, are erecting a building in Westminster in which they propose to establish a gas-meter manufactory, and, in this connection, have offered to provide, free of cost to the Council, suitable accommodation for the testing of gas-meters on the premises. In view, however, of the desirability of maintaining independent stations for gas-meter testing purposes, and of the fact that in 1912 a similar request from a London firm was not acceded to, the Committee have declined the offer.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 1.

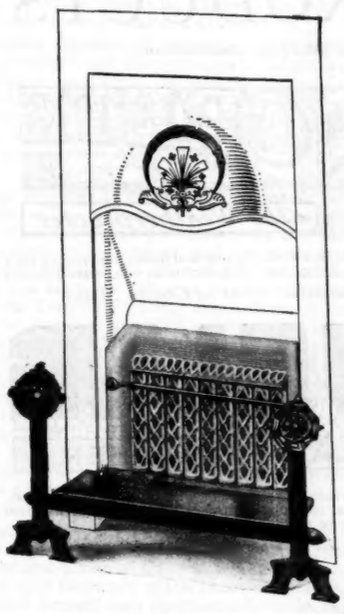
The London Market for tar products continues steady. Pitch maintains its firm tone at not below 220s. per ton net f.o.b. makers' works. Creosote is firm at about 1s. 4½d. per gallon net. Pure benzole and pure toluol are quoted at about 4s. 3d. to 4s. 6d. per gallon. Solvent naphtha is about 3s. 6d. per gallon. Pyridine bases is quiet; makers' idea of price being from 18s. to 20s. per gallon.

In sulphate of ammonia there is nothing particular to record; the price for November automatically advances to £25 13s. 6d. per ton, basis 24⅝ p.ct. to farmers, with a discount of 10s. per ton to dealers.

Tar Products in the Provinces.

Nov. 1.

The average values for gas-works' products during the week were: Gas-works coal tar, 128s. to 133s. Pitch, East Coast, 215s. to 217s. 6d. per ton f.a.s.; West Coast—Manchester, 200s. to 210s.; Liverpool, 200s. to 210s.; Clyde, 205s. to 215s. nominal. Benzole 90 p.ct. North, 3s. 1d. to 3s. 2d.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 3s. 2d. to 3s. 3d. Toluol, naked, North, 3s. 1½d. to 3s. 2½d. nominal. Coal tar crude naphtha in bulk, North, 1s. 2d. to 1s. 3d. Solvent naphtha, naked, North, 3s. to 3s. 2d. Heavy naphtha, North, 3s. 1d. to 3s. 3d. Creosote, in bulk, North, liquid, 1s. 0⅝d. to 1s. 1⅜d.; salty, 1s. to 1s. 1d. Heavy oils, in bulk, North, 1s. 1d. to 1s. 2d. Carbolic acid, 60 p.ct., 3s. 3d. to 3s. 6d. Naphthalene, £37 10s. to £40; salts, £10 to £10 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.



THE RIGHT THING IN THE RIGHT PLACE.

AN "Entente" fitted in a grate. The quality of fitness—both in a mechanical and artistic sense—is peculiarly its own.

The "Entente" can be adjusted to suit varying structural conditions. It brightens dull grates and does not clash with the mos t ambitious decorative scheme.

A sound, workmanlike job, it pleases everybody. Order a sample. The fitting is simple and inexpensive.

R. & A. MAIN, LTD.,

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is very little to report on the tar products market during the past week. Business is still held up; although the coal strike has been settled. But until the final ballot has been taken, and the men are actually back at work, people are disinclined to either buy or sell, except in very small quantities. Rumours are going around that pitch must get easier; but well-informed circles give no credence to this view. Of course, while the South Wales briquette works are stopped, there is little consumption there; but, meantime, Continental users are working through their fuel stocks, and when South Wales commences to manufacture again, there should be a heavy export demand. A slump may be coming next year; but there seems no reason why it should affect fuel this winter. Crude tar, and also refined, is rather dearer. Solvent naphtha has advanced on a little buying from some rubber manufacturers who have allowed their stocks to run-down too low. Creosote continues in strong demand; its use as a fuel evidently is extending. Export licences for naphthalene cannot now be obtained; but prices are without change. Carbolic acid is very weak and flat, and there is no demand for crude; while crystals are being sent back from Japan. Cresylic acid is dearer. Intermediate products do not change much. The supply is never equal to demand, and prices tend upwards. The settlement of the coal strike has come none too soon, as several important firms were on the point of closing-down. It is hoped, however, that this step may now be avoided.

Latest values are as follows:

Benzole: 90% London 4s. 1d., North 3s. 10d. to 3s. 11d.; 50-90% 3s. 6d. London, 3s. 3d. to 3s. 4d. North; crude 60-65%, 2s. 5d. to 2s. 7d.; pure, 4s. 3d. per gallon naked.

Crude Tar: London, 105s. to 115s.; Midlands, 107s. 6d. to 117s. 6d.; North, 105s. to 115s. per ton *ex* works. Refined tar, 95s. per barrel (free) on rail.

Pitch: London, 225s. per ton f.o.b.; East Coast, 215s. per ton; West Coast, 215s., with Manchester 210s. per ton, and Glasgow 215s. per ton; South Wales, 222s. 6d. per ton.

Solvent Naphtha: London, 3s. 6d.; Provinces average 3s. 4d. per gallon.

Crude Naphtha: Naked, 1s. 1d. to 1s. 2d.; North, 1s. per gallon.

Heavy Naphtha: 3s. 6d. per gallon.

Naphthalene: Refined flake, £60 per ton nominal; inferior, £35; crude, £18 to £35 per ton, according to quality.

Toluol: Naked, 3s. 4d. per gallon nominal; North, 3s. 2d.; pure, 4s.

Creosote: London, 1s. 2d. to 1s. 3½d.; North, 1s. 2½d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 1s. 4d. to 1s. 6d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 9d. per lb., drums extra.

Aniline Salts: 1s. 11d. per lb.

Cresylic Acid: Crude, 4s. 2d.; 95%, 4s. 9d. to 5s. 3d.; 97-99%, 5s. 6d. to 5s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. 3d. per gallon; crystals 40%, 10d. per lb. nominal.

Salicylic Acid: Technical, 2s. 7d.; B.P., 3s. 3d. per lb.

Xylol: Pure, 6s.; commercial, 5s. 3d. per gallon.

Resorcin: 16s. to 17s. per lb.

Alizarine 20%: 2s. per lb.

B. Naphthol: 4s. 3d. per lb.

Sulphate of Ammonia.

Trade in this material during the past week has been quiet, but the undertone has remained good. Had the coal strike lasted any length of time, its effect upon the production of sulphate of ammonia would have been pretty serious. Export trade is very fair in quantity; but not so good in price according to most reports.

News from America is that the market there is dull, with fair amounts offered for resale at various points. From the Pacific Coast it is reported that there is no improvement in the situation. The needs of the trade, which have been much curtailed on account of the high cost, are said to be well supplied.

Mainlaying for Housing Schemes.—The Gas Engineer (Mr. J. P. Leather) has reported to Burnley Gas Committee that, in connection with the supply of gas to houses under the Manchester Road housing scheme, it is necessary that 3488 yards of mains be laid, and that the present cost of doing this would be about £3000, not including services. It would also be necessary to purchase additional pipes, at an estimated cost of £2300. The Council have authorized him to proceed with the work.

Miners' Strike and the Terms.—Nearly a fortnight ago, the chairman of a large gas company in the Southern Counties addressed a letter to "The Times" in which he made suggestions for arriving at a basis for composing the differences between the coal owners and the miners which it will be seen were very much on the lines subsequently taken. The suggestions he made were: (1) That surplus revenue from exported coal should not go to the State, except to pay direct outgoings connected with the State control of coal. (2) That any future increases to the miners should be charged such surplus revenue, with an immediate advance of 2s. per shift, *plus* a bonus of *x* per ton of coal exported. (3) That after the deductions thus provided for, the balance should be applied to the reduction of the pithead price of coal consumed for all purposes in the United Kingdom. Such an arrangement or agreement would, of course, continue only so long as export prices were sufficient to yield the necessary surplus revenue.

A TRIUMPH FOR BRITISH ENTERPRISE.

THESE UNIQUE PRODUCTS

Synchronise the requirements of the concrete age and will revolutionise building construction.

NOVOID
THE CONCRETE PROOFER
REGISTERED TRADE MARK

A powder which chemically acts upon Portland cement, and renders concrete weather, water, and oil proof by filling the voids with insoluble silicates.

"Novoided Concrete is Bone Dry under Pressure."

RENCRETE
REGISTERED TRADE MARK
The Weatherproofer

A solution similar to Everok, in a variety of practical shades, for proofing brick, plaster, stucco, etc., and rendering concrete decorative as well as weatherproof.

"The First Successful Effort in Cement Stains."

EVEROK
THE WATERPROOFER
REGISTERED TRADE MARK

A colourless solution on the Novoid principle for proofing and hardening existing cement, concrete, brick, etc. Eminently suitable for concrete floors, to prevent "dusting up," as it

"Sets Like a Rock."

QUELLE
THE FLAMEPROOFER
REGISTERED TRADE MARK

A preservative stain made in colours, to represent pitch pine, oak, walnut, etc., which renders woodwork fire, moisture, and rot-resisting, and prevents even green timber from shrinking or swelling.

"A Perfect Primer for Enamel."

BOOKLET POST FREE BY STATING THIS PAPER.

AURORA
REGISTERED TRADE MARK
DISTEMPER

The latest and most economical water paint. Supplied ready for the brush. Surfaces 640 yds. per cwt. on "Sirapite." Being "colloidal" in action, it becomes an integral part of the plaster itself.

"A Really Washable Distemper."

WRITE FOR TINT CARD AND PRICE LIST POST FREE

"THE KEENEST CRITICS HAVE BEEN CONVINCED THAT WHAT IS NOW PUT BEFORE THEM IS THE TRUTH."

THE TORBAY & DART PAINT COMPANY, Ltd., 26-28, Billiter St., LONDON, E.C.3

South Shields Public Lighting Cost.

To the South Shields Corporation General Purposes Committee, the Sub-Committee reported that they had further considered the claim of the South Shields Gas Company for extra costs for public street lighting. Mr. Dugald Curry, the Engineer of the Gas Company, attended the Sub-Committee. It had been agreed between the Borough Engineer and the Gas Company's Engineer that the Company had spent £2688 for the year 1919 in performing public street lighting services, comprising lighting and extinguishing, repairs, and maintenance (but excluding gas supplied) over and above the contract price. The extra cost incurred for the first two quarters of 1920 had been agreed at £1641; and the Borough Engineer estimated that for the remainder of the year the extra cost would amount to a similar sum to that of the first two quarters—making a total of approximately £5971 for the years 1919 and 1920. The Sub-Committee recommended that the Company be offered, without prejudice to the rights of the Corporation under the existing agreement, the actual extra cost incurred as from July 1, 1919; the claims for the first two quarters of 1919, amounting to £1466 being eliminated. The report was confirmed.

Our Coal Resources.

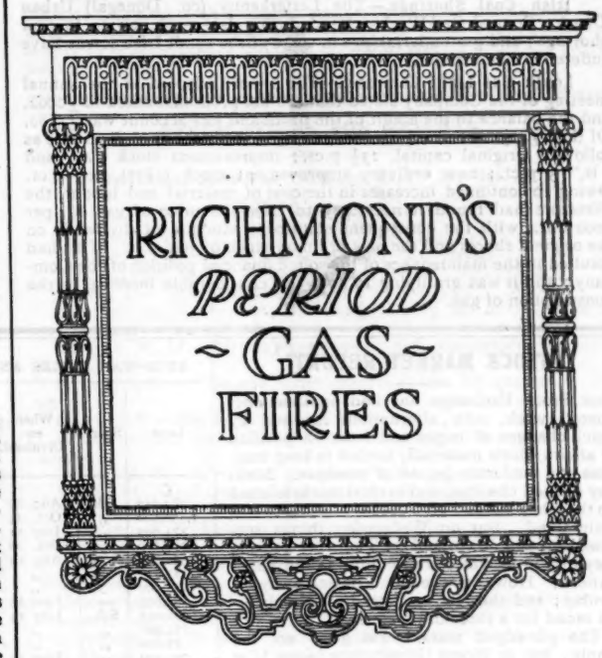
Sir Robert A. Hadfield, on the 27th ult., addressed the following letter upon this subject to "The Times:" In the negotiations for a settlement of the coal dispute, public interest has been concentrated on the problem of increasing output. Little (one might say nothing) has been said of the use which we make, and propose to make, of the coal actually mined. But in its final aspect output is relative only—relative to the use we make of it. It is for a consideration of the problem in this aspect that I now venture to address you. I have just concluded my year of office as President of the British Commercial Gas Association; and the knowledge which has come to me through my connection with this organization, which includes research in its programme, has brought home to me more forcibly than ever before the criminal waste of which we are guilty in our use of coal for both industrial and domestic purposes. The Government themselves have recognized this fact, and have appointed more than one Committee to investigate possible means of economy. But is it not a mistake to single out one source of supply alone? I believe, for instance, that the motive of the Electricity Supply Bill was fundamentally sound, in so far as it was an attempt to conserve our coal resources. The flaw which marred it was the fact that it considered only one source of energy, only one expedient for the economic use of coal. What we need is a comprehensive inquiry into all sources of fuel energy. Our supplies of coal are not inexhaustible. We all want increased output; we want still more to eliminate the present system which wastes about one-quarter of the coal raised. We can only do this (1) by a scientific inquiry into coal conservation on its broadest lines, and (2) by mutual co-operative action between the various agencies for the supply of energy, whether for use as power, light, or heat.

Lancaster Coal Stocks and Gas Price.—At the last meeting of the Lancaster Town Council, Mr. T. Till (the Chairman of the Gas Committee) complimented the Manager (Mr. G. Dixon) upon his foresight in having secured supplies of coal sufficient to last at least six weeks. A further rebate of 7d. per 1000 c.ft. was promised the consumers on their last quarter's accounts.

German Sulphate of Ammonia.—It is reported in the "Chemical Trade Journal" that the 2500 tons of sulphate of ammonia which will be delivered monthly by Germany to France during October, November, and December this year, in accordance with the terms of the peace treaty, will be sold at the following price per 100 kilogrammes: 142 frs. in bulk, and 147 frs. in strong new bags containing 100 kilos. These prices are *ex* truck at the French frontier, and include import duty.

Gas Stoppage at Perth.—A stoppage of gas has been experienced at Perth, as an indirect result of the coal strike. The trouble was caused by inferior coke produced from coal taken from stock causing the furnaces to get choked and the heats to fall, with consequent serious reduction in the make of gas. The coal in question was a non-caking coal from the Fife area, to which the gas-works were restricted under the Transport Order. Steps were, of course, at once taken to have the furnaces attended to; but the improvement was only temporary. Mr. David Vass (the Gas Manager) tried, by wheeling cold coke up to the furnaces, to improve the heat on the retorts, and also took special steps to select the coal to be used in the retorts; but there was little improvement. Then the pressure was reduced, with, however, very slight effect on the consumption, as compared with the previous week. During last Wednesday morning, the average quantity of gas made per hour was about 50 p.ct. of the actual requirements. Intimation was then made in the papers of a reduction in pressure till further notice, between 6 p.m. and 6 a.m., in order it possible to maintain a supply for industrial purposes.

Mr. Hayday, M.P., and the Gas Industry.—In a recent interview at Nottingham, Mr. Arthur Hayday, M.P., the District Organizer of the National Union of General Workers, who acts also upon the men's side as Joint Secretary of the Industrial Council for the Gas Industry, expressed himself very optimistically as to the probable outcome of the labours of the Board—pointing out that very substantial progress is being made towards the settlement of questions which gave rise to keen controversy some months ago, threatening at one period to lead to a strike. He recorded with satisfaction that the zoning and grading scheme, the principle of which had been accepted in relation to undertakings and districts of varying size throughout the country, was now making substantial progress towards completion, and that the question of establishing a minimum of, as nearly as possible, uniform rates throughout the various zones had also been remitted to the consideration of the Regional Councils. A draft constitution for the establishment of various Works Committees had likewise been agreed to. He welcomed with particular gratification, as an outcome of last week's meeting of the Joint Industrial Council, the launching of a project for educational and technical classes for gas undertaking employees under Whitley Councils.

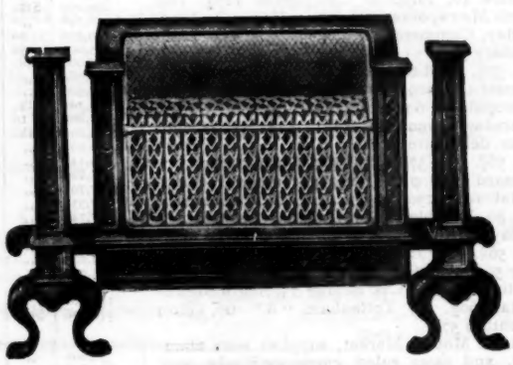


It is difficult to quickly demonstrate to prospective customers the remarkable radiant efficiency of Richmond's "Period" Gasfires.

Attention, however, is at once attracted by Purity of Design, Beauty of Outline, and Perfection of Finish—features which, in addition to maximum radiant efficiency, commend these Gasfires to the most refined and exacting taste.

In the special "Period" Brochure posted you this week we have endeavoured to reflect that note of distinction which characterises the whole of the "Period" Series of Silent Gasfires.

THE RICHMOND
GAS STOVE & METER CO., Ltd,
WARRINGTON —— and —— LONDON.



The **Jacobean.**

Richmond

Irish Coal Shortage.—The Letterkenny (co. Donegal) Urban District Council Gas-Works closed during last week, owing to coal shortage; and gas undertakings in some of the small Irish towns have suffered in like manner.

Louth Gas Light Company.—The report adopted at the annual meeting of the Company stated that the net profit amounted to £2002, and the balance to the credit of the profit and loss account was £5680. Of this, £4258 is carried forward, and £1422 absorbed in dividends as follows: Original capital, 13½ p.c.; improvement stock "A" and "B," 5 p.c.; new ordinary improvement stock (1877), 10½ p.c. Owing to continued increases in the cost of material and labour, the Directors had found it necessary to raise the price of gas 6d. per 1000 c.ft., with the consequent statutory reduction of dividends on the original shares and the new ordinary stock of 30s. p.ct. This had resulted in the maintenance of the sound financial position of the Company; and it was gratifying to note the considerable increase in the consumption of gas.

Gas-Stove Fatality at Kingston.—After inquiring into the circumstances of the case, the Coroner recorded a verdict of "Accidental death due to coma from asphyxia," in the case of Mr. J. H. Greenwood, of Kingston Hill. Deceased, who was subject to bronchitis, had a bad cold, and after retiring at ten o'clock, was found dead in bed next morning. He was accustomed to sleeping in winter with a gas-fire alight. It was a small stove with asbestos in front, and a flue leading to the chimney. All was in good order; and the room was a fair-sized one. A doctor found the gas full on and alight; but the room was full of fumes—the window having been shut and fastened. Deceased had been advised to keep the window open. The night in question was very foggy, and the chimney would be damp. Had the window been open, the draught would have been better. Death resulted from inhalation of carbon dioxide. Another witness said the gas-fire had not been lighted since March last. The heavy atmosphere outside would prevent the free passage of the fumes. The pipe was of 3 in. diameter.

STOCK MARKET REPORT.

THE Stock Exchange has had another chequered week, with alternations inspired by quick changes of hopes and fears—a position of affairs which materially tended to keep business at a moderate degree of pressure. Monday opened cheerful, and several markets lifted up their heads: and on Tuesday steadiness was maintained. But on Wednesday things seesawed up and down, and on Thursday became very dull in face of the new hitch in the negotiations. However, the cloud passed away on Friday; and the House closed in fairly cheerful mood for a three-days' rest.

The gilt-edged market was good on the whole; but in Home Government issues War Loan had a fall, and Consols were a little easier, the prices for the four being: Consols 44⅜-45⅛, War Loan 82¼ 82½, Funding 67⅝-68, Victory 73⅜-73⅝. Bonds and Corporations were firm, and Indians advanced. Home Rails had a smart rise, and Argentines strengthened considerably.

In the Foreign Market, French were hit by bad exchange, and Russian and Greek were both easier. Brazilian, Chinese, and Japanese did well.

In the Miscellaneous Market was a widespread list of advances.

Business in the Gas Market showed much improvement, mostly in the leading issues; and the market seemed at last to be realizing the potentialities for the gas industry opened-up by recent legislation. A fine lead was made by advances in the London companies. Gas Light ordinary, which opened at 51, rose quickly but steadily on Wednesday to 58, and closed firm with a rise of 6 in the quotation. South Metropolitan rose from 57½ to 61; and the quotation was advanced 3. Commercial was firm and unchanged. Imperial Continental advanced from 126½ to 131½, with a rise in quotation of 2. There were no dealings marked in Primitiva.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 51, 51¼, 51½, 52, ditto maximum 38½, ditto preference 56½, 58, Ilford "A" and "C" 78, Imperial Continental 126½, 127, 127½, 128, 128½, ditto debenture 85½, 85⅝, 85⅞, 86, South Metropolitan 58, ditto debenture 46, South Suburban debenture 67, Tottenham "B" 53, Brighton and Hove 6½ p.ct. preference "B" 74⅜, 75, Colonial Gas Association 7 p.ct. preference 14s. 6d. On Tuesday, British 21¼, Commercial 4 p.ct. 56½, ditto 3½ p.ct. 48½, Gas Light ordinary 52½, 53, 53⅜, ditto preference 57, ditto debenture 46, Imperial Continental 127¼, 129, South Metropolitan 57½, 59, 59½, 60. On Wednesday, Commercial 4 p.ct. 56, 56½, Gas Light ordinary 54½, 55, 55⅜, 55½, 56, 56¼, 57, 57¼, 57⅜, 57¾, 58, ditto maximum 39, Imperial Continental 129, 129½, 129¾, 130½, 130¾, 131, South Metropolitan 60, 60½, 60¾, Danish 5. On Thursday, Brentford "B" 50¼, 51, Buenos Aires debenture 39, 39½, Gas Light ordinary 56½, 56⅝, 57, 57½, 57⅝, 58, Hastings and St. Leonard's 3½ p.ct. 38½, 39, Imperial Continental 129⅜, 130¼, 131, 131½, ditto debenture 85½, 86, Wimbledon 44, Colonial 12s. 6d. On Friday, British 21½, 21⅜, Commercial 4 p.ct. 56½, 56⅝, 56¾, European 6¾, Gas Light ordinary 56¼, 57, 57½, ditto maximum 39½, Imperial Continental 131, Lea Bridge 75, South Metropolitan 60¾, 61, Tottenham "A" 60, ditto debenture 57.

In the Money Market, supplies were abundant, and rates ruled correspondingly easy until the close of the month was at hand, when they hardened in response to a quickening demand. Discount was firm; but there was not much doing. Silver hardly moved in quotation. The Bank rate is 7 p.ct., fixed on April 17 last.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 27	4	4%	Aldershot 4 p.c. Pref.	...	56—61	...
1,551,868	,,	Oct. 14	2½	3⅛%	Alliance & Dublin Ord.	59—64	36—41	...
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	Oct. 28	7½	8%	Bombay, Ltd.	5¼—6¼	4¼—4¾*	...
50,000	10	Aug. 12	16	5%	Bourne- mouth Gas and Water — 10 p.c.	29—30	8—9	...
383,110	10	,,	7	7%	Bourne- mouth Gas and Water — B 7 p.c.	15—15½	8½—9½	...
115,000	10	,,	6	6/-	Bourne- mouth Gas and Water — Pref. 6 p.c.	13½—14	7½—8½	...
162,065	—	June 25	—	4%	Bourne- mouth Gas and Water — 4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid.	261—266	50—55	...
734,920	,,	,,	11	26/3	Do. B New	204—209	47—52	50½—51
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—73	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb.	91—93	60—63	...
214,775	,,	Aug. 27	11	7½%	Brighton & Hove Orig.	208—213	120—125	...
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	78—83	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Sept. 15	12½	10%	British	44—45	20—22	21¼—21⅝
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	39—42	39—39½
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1½—2½	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref.	4—6	5½—6½	...
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	Aug. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	54—59	56—56½
560,000	,,	,,	5½	26/3	Do. 3½ p.c. do.	103—105	47—52	48½
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	25—30	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—50	...
51,600	,,	Aug. 27	14½	10½%	Croydon A 10 p.c.	...	125—135	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	..	85—95	...
492,270	Stk.	—	6	5%	Derby Con. Stk.	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	6½—7½	6¾
16,298,975	Stk.	July 29	4/17/4	30/-	Gas Light and Coke — 4 p.c. Ord.	98—102	55—58	51—58
2,600,000	,,	,,	3½	26/3	Gas Light and Coke — 3½ p.c. max.	76—79	38—41	38¼—39½
4,062,235	,,	,,	4	4%	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	55—58	56½—58
4,674,850	,,	June 25	3	3%	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	45—48	46
130,000	,,	Dec. 11	10	10%	Gas Light and Coke — 10 p.c. Bonds.	...	...	...
82,500	,,	Sept. 15	5	3⅛%	Hastings & St. L. 5 p.c.	...	53—58	...
258,740	,,	,,	3½	2⅛%	Do. 3½ p.c.	87—89	37—39	38½—39
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16½—16¾	8½—9½	...
86,600	Stk.	Sept. 15	9	5⅝%	Hornsey 7 p.c.	...	87—89	...
131,000	,,	Aug. 12	7½	4⅝%	Ilford A and C	151—154	79—84	78
65,780	,,	,,	6½	3⅞%	Do. B	115—118	64—69	...
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb.	92—94	55—58	...
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	127—132	126½—131½
1,235,000	,,	Aug. 12	3½	3⅛%	Do. 3½ p.c. Deb. Red.	84—86	82—87	85½—86
235,242	,,	Sept. 15	6½	5%	Lea Bridge Ord. 5 p.c.	119—121	80—85	75
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. — A.	211—213	...	...
					Liverpool 5 p.c. Ord. — B.	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 12	7/5/6	3⅛%	Maidstone 5 p.c.	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4⅜	1¾—2¼	...
250,000	100	Oct. 1	4½	4⅛%	Met. of Melbourne — 4½ p.c. Deb.	99—101	86—93	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11½—12	70—75	...
1,875,892	,,	July 29	4½	3⅛%	Newcastle & Gatsh'dCon.	98½—99½	61—63	...
529,705	,,	June 25	3½	3⅛%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Sept. 15	—	8%	North Middlesex 10 p.c.	...	12½—13½	...
55,940	10	,,	7/14/0	52½%	,, ,, 7 p.c.	14—15	7—7½	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd.	117—122	98—101	...
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	...
60,000	50	Aug. 27	13	7½%	Portsea Island, B	128—131	65—70	...
100,000	50	,,	12	6½%	Do. C	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	¼—½	...
499,960	3	June 26	5	—	Do. 5 p.c. Pref.	4½—5	1—1½	...
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	69—71	...
600,000	Stk.	July 29	4	4%	Do. ,, ,, 1911	...	40—42	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	38—43	...
150,000	10	Sept. 30	6	6/-	San Paulo — 6 p.c. Pref.	10½—11	6½—7½	...
125,000	50	July 2	5	5%	San Paulo — 5 p.c. Deb.	47—49	38—40	...
135,000	Stk.	Aug. 27	10	5%	Sheffield A	223—224	68—73	...
209,984	,,	,,	10	4%	Do. B	222—224	58—63	...
523,500	,,	,,	10	3½%	Do. C	220—222	53—55	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	Sept. 30	9	9%	South African	10½—11½	10½—11½	...
6,609,895	Stk.	Aug. 12	5/4/0	30/-	South Met. 4 p.c. Ord.	111—113	58—63	57½—61
250,000	,,	July 14	—	5%	Do. Pref.	...	91—93	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	45—47	46
224,820	,,	Aug. 27	8½	3%	South Shields Con. Stk.	157—159	95—96	...
1,087,795	,,	July 29	6	3⅛%	S'th Suburb'n Ord. 5 p.c.	114—116	57—62	...
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	65—70	67
647,740	,,	May 13	7½	3⅛%	Southampton Ord.	99—102	57—60	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 12	—	3⅛%	Tottenham District — A 5 p.c.	135—138	60—65	60
782,275	,,	,,	6	2⅛%	Tottenham District — B 3½ p.c.	115—117	50—55	53
181,255	,,	June 10	4	4%	Tottenham District — 4 p.c. Deb.	87—89	57—60	57
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Sept. 15	5	3⅛%	Tynemouth 5 p.c. max.	108½—109	69—71	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Aug. 27	8½	47/6	Wandsworth A 5 p.c.	151—156	75—80	...
255,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	53—58	...
108,075	,,	,,	—	33/3	Do. C	...	50—55	...
140,865	,,	,,	—	33/3	New Ordinary	...	50—55	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c.	117—122	43—48	44
98,000	,,	,,	6½	32/6	Epsom 5 p.c.	121—126	50—55	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk.	66—69	44—47	...

* Ex Div.

A Strange "Employment" Proposal.

The General Purposes Committee of the Fulham Borough Council report that, among the suggestions for creating employment which were put forward on behalf of ex-service men by a deputation that attended before the Council, was that of the conversion of all street gas-lamps to electric lighting; and the Committee have given the matter careful consideration. Unfortunately, the expenditure involved under existing abnormal conditions is altogether out of proportion to the comparatively small number of extra men who could be employed on the work. The total estimated cost of the scheme is £42,097, or approximately £4000 per annum for repayment of capital and interest charges, spread over a period of twenty years. Against this, a return of about £2200 might be expected from the sale of current. The scheme would provide employment for not more than fifty or sixty extra men during the winter months, dependent on securing delivery of materials; and while eight or nine additional men would be required on the permanent staff, these would only displace men at present employed on gas-lamps, and would not therefore tend to decrease employment. In all the circumstances, the Committee think the Council will agree that it is inexpedient, under present conditions, to proceed with the work; and for the time being the Committee have reluctantly so decided.

End of a Troubled Committee.—The War Wages Committee of the Bradford Corporation ceased to exist with the end of the City Council year last week; the Council having decided that the Committee should not be further appointed. Practically every finding of the Committee, throughout its career, has been disputed and challenged; and its end was no less rough than its passage through the years. Its work was to avoid anomalies; but it was pointed out at last week's Council meeting, by Mr. J. H. Barraclough (the Chairman of the Gas Committee) who moved an amendment seeking approval for gas department wages which the War Wages Committee had not endorsed, that there were glaring anomalies. For instance, a foreman stoker was receiving considerably higher pay than a works superintendent. The Council little knew how near they had been to serious things in the Gas Department; and they did not want any further irritation. In the course of the meeting, it was stated that the average advances to Gas Department workmen had been from 150 to 211 p.ct. above the 1914 level; whereas the advances to the staff averaged only 104 p.ct. The amendment was carried.

The strike of gas-workers in Cairo has been settled.

The Staindrop Gas Lighting and Heating Company (1920), Ltd., has been registered, with a capital of £1500 in £1 shares, to take over the business of the Staindrop (Darlington) Gas Company.

The Directors of Meters Ltd. have declared interim dividends, on account of the current year, at the rates of 5½ p.ct. per annum on the preference shares and 5 p.ct. per annum on the ordinary shares.

The Directors of the Monte Video Gas and Dry Dock Co., Ltd., have declared an interim dividend on the ordinary stock for the half year ended June 30 last of 3 p.ct. (actual), free of income-tax, payable on Dec. 1. This compares with 2½ p.ct. free of tax for the corresponding period of 1919.

Negotiations are in progress between the Shipley and Baildon District Councils, with a view to main extensions by the Shipley Gas Department in the Baildon district, both for street lighting and for supply to existing houses and dwellings to be erected under the public housing scheme.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Oct. 27.]

Nos. 29,324—30,063.

AYMARD, M. F. L. A.—"Gas containers." No. 29,432.
BAMBER, H. W.—"Gas-producers, &c." No. 29,647.
BARTOLOMEIS, R. DE.—"Distillation of fuels." No. 29,365.
BERRY, J.—"Prepayment gas-meters." Nos. 29,637, 29,638.
BLACKSTONE, G. M.—"Air and gas governing and mixing valve for gas-engines." No. 30,031.
BUNKER, W. H.—"Rotary gas-engines, and compressors therefor." No. 29,669.
BURROWS, A.—"Gas and water control valves for geysers." No. 29,976.
CARTER, E.—See Blackstone. No. 30,031.
COLUMBO AND ING. DE BARTOLOMEIS.—See Bartolomeis. No. 29,365.
DAVIS, H. N.—"Producer gas plant." No. 29,557.
DAVIS, H. N.—"Gas cooking-stoves." No. 29,558.
DAVIS, H. N.—"Geysers." No. 29,559.
DOCKING, A.—"Rotary retort-furnaces." No. 30,011.
DOHERTY, H. L.—"Coke-discharging apparatus." No. 29,945.
DOUGAN, O. W.—"Device for retaining gas stop-bags in position." No. 29,613.
DUCKHAM, SIR A. M.—"Heating materials at successively different temperatures." No. 29,678.
DUCKHAM, SIR A. M.—"Furnaces for producing chemical changes." No. 30,059.
FOSTER, J.—"Gas for power purposes." No. 29,459.
GAMBELL, H. C.—"Gas-regulating devices." No. 29,387.
GAUNT, C. F.—"Inverted incandescent gas-burners." No. 29,705.
GEE, J. E.—See Gambell. No. 29,387.
KEITH, J.—"Gas-governor." No. 29,758.
MAYLOR, J. A.—See Berry. Nos. 29,637, 29,638.
METERS, LTD.—See Berry. Nos. 29,637, 29,638.
NUNNS, H.—See Gambell. No. 29,387.
PARKER, J. W.—See Bamber. No. 29,647.
PULLAR, J. J.—See Burrows. No. 29,976.
PYZEL, D.—"Distillation." No. 29,525.
SHARP AND PRESTON.—See Docking. No. 30,011.
SIBLEYS, LTD.—"Incandescent gas lighting." No. 29,366.
SNELL, C. SCOTT-.—See Sibleys. No. 29,366.
STRACHE, H.—"Combustion of bituminous fuels with recovery of bye-products." No. 29,551.
TWIGG, W. R.—See Davis. Nos. 29,557, 29,558, 29,559.
WORTHINGTON, J.—"Method of utilizing peat or turf for heating and for generating steam, electricity, or gas." No. 29,701.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	28/-	15/-	8/8
	Credit Rate:	32/-	16/-	9/6
Abroad (in the Postal Union) Payable in Advance		32/6	17/-	10/-

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON
FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE
PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO. LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C. 2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." Phone 248 Holborn.
And 8, St. Nicholas Buildings, Newcastle-on-Tyne.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CHEMICAL PLANT ENGINEERS, BOLTON, LANCS.
Telegrams—"SATURATORS, BOLTON," Telephone 0848.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
38, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
38, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
38, ST. MARY AT HILL, LONDON, E.C. 3.
Phone: Avenue 6680.

INVENTIONS PATENTED. TRADE MARKS REGISTERED.
Advice and Handbook free. 35 years' references. Gas Patents a Speciality. KING'S PATENT AGENCY, Ltd. (Director, B. T. King, A.I.M.E., British and U.S. Regd. Patent Agent), 146a, QUEEN VICTORIA STREET, LONDON, E.C. 4.

ROBERT DEMPSTER & SONS, Ltd., ELLAND, Gas Engineers and Contractors for CARBONIZING PLANTS on Horizontal or Vertical Principles, and Stoking Machinery. HANDLING INSTALLATIONS, including Coal Breaking, Elevating, Conveying Plants and Coke Screening, Storing and Telpherage Plants. PURIFICATION.—All Branches of Wet and Dry Purification. STORAGE.—Gasholders, and all forms of Gas Apparatus. Wire: "DEMPSTER, ELLAND." 'Phones: ELLAND 261, 262, 263.

EXTENSIONS.—Gas-Works requiring Alterations or Additions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, 15, Park Row, Leeds, who make a Speciality of Gas Apparatus, Coke-Oven Plant, and Structural Steel Work. Inquiries Solicited. Satisfaction Guaranteed. Telephone No. 22,579 LEEDS.

TULLY'S PATENT.

CARBURETTED HYDROGEN PLANT
for 300 to 500 B.Th.U.

COMPLETE GASIFICATION OF COAL.

BALE AND HARDY, LTD.,
99, VICTORIA STREET, LONDON, S.W. 1.

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING
MATERIALS CO., LTD.
(W. T. P. CUNNINGHAM, Proprietor.)
13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608.

BRITISH LUX.
AN EXCELLENT PURIFYING MATERIAL
Features:—
(a) Porosity equal to Best Bog Ore.
(b) Contains Ferric Hydrate in an active state, thus resembling "Lux."
(c) Prepared in good mechanical condition ready for Purifiers.
DANIEL MACVIE, 1, NORTH ST. ANDREW STREET, EDINBURGH.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENSER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.,
Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

ALDER AND MACKAY, LTD.
(ESTABLISHED 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.
(See p. 304.)

GEORGE WILSON GAS METERS, Ltd.
for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 7/9, Grosvenor Street, C.onM., MANCHESTER.
Telephone: 3214 CITY. Telegrams: "GASMETER,"
and 46 & 47, Auckland Street, LONDON, S.E. 11.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Aug. 18, p. 360.

NATIONAL ASSOCIATION OF TECHNICAL GAS OFFICIALS.
Head Office:—Temple Courts,
55, Temple Row,
BIRMINGHAM.
Full particulars for membership, &c., can be obtained from the General Secretary.

CITY AND GUILDS GAS EXAMINATIONS.

MR. CRANFIELD'S well-known and Long-Established Correspondence Classes prepare Students for these Examinations. Individual Attention Given to Students; and the highest results obtained year by year.
Full Particulars on Application to MANOR COURT AVENUE, NUNEATON.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

BOROUGH OF TODMORDEN.

ASSISTANT MANAGER.

THE Gas Committee are prepared to receive Applications for the Position of ASSISTANT GAS MANAGER.
Applicants must have had Practical Experience in Gas-Works Routine, possess good Technical Knowledge, and be able to Carry Out the usual Testing Work required. The commencing Salary will be £300 per Annum.
Applications, stating Qualifications, Experience, Age, and References, to be addressed to the Chairman of the Gas Committee, Town Hall, Todmorden, and to be received not later than Nov. 13.
F. V. BARNES,
Engineer and Manager.

THE Sheffield Gas Company require the Services of a Capable, Energetic Man as ASSISTANT GENERAL FOREMAN at their Neepsend Works. Candidates must have Experience in the Control of a large number of men, and in the Working of Modern Gas-Works Plant. Experience with Electric, Hydraulic, and Pneumatic Machinery, and Carburetted Water-Gas Plant desirable.
Wages, £6 per Week, including Bonus. Promotion is forthcoming to a Capable Man.
Applications, stating Experience, Age, and whether Married or Single, to be made to MR. RALPH HALKETT, eneral Manager, not later than NOV. 8, 1920.
Gas Offices,
Commercial Street,
Sheffield, Oct. 27, 1920.

CLERK OF WORKS.—Capable and Qualified Men for General Works Construction, preferably with good Experience in Ferro-concrete.
State Age and Wages required to A. V. BARRACLOUGH, Gas and Water Engineer, Aldershot Gas, Water, and District Lighting Company.

DRAUGHTSMAN (age 25), Experi- enced in Conveying and Elevating, Structural, and Building Work. Moderate Salary.
Address, No. 6989, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

APPOINTMENTS, &c., WANTED.

GENTLEMAN, having had 14 years' Experience in the Management of a Colonial Gas Company, is anxious to obtain an APPOINTMENT as Secretary to a Gas Company in England. Satisfactory References can be furnished.
Address No. 6985, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

PLANT, &c., FOR SALE & WANTED

FOR SALE—The following Second- Hand PLANT:—
One West's CHARGING AND DRAWING MACHINE.
One COKE BREAKER, by Waller.
One Small CAMERON TYPE PUMP, 2 in. Plunger.
Two Small Evan's TAR PUMPS, out of repair.
One Combined STEAM ENGINE AND EXHAUSTER.
One Small HORIZONTAL STEAM-ENGINE.
One Small CYLINDRICAL STATION METER.
For Particulars and to View, write JOSEPH REEDS MATLOCK BATH, DERBYSHIRE.

COMPANY NOTICE.

ORIENTAL GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that an ORDINARY GENERAL MEETING of this Company will be held at the Company's Office, Finsbury House, Blomfield Street, London, E.C., on Wednesday, the 17th day of November, 1920, at Twelve o'clock noon precisely: To receive the Directors' Report and the Accounts of the Company for the Year ended the 30th of June, 1920; to declare a Dividend; and to elect a Director and Auditors in the place of those retiring.
The TRANSFER BOOKS WILL BE CLOSED from the 2nd to the 17th of November, both days inclusive.
By order of the Board,
S. RAINER,
Secretary.
Finsbury House, Blomfield Street,
London, E.C., Oct. 27, 1920.

CONTRACTS OPEN.

CITY OF NOTTINGHAM.

THE Works and Ways Committee are prepared to receive TENDERS for the Supply of the undermentioned STORES and MATERIALS, the Contracts to commence on the 1st of January next, and to terminate on the 31st of December, 1921:—
A—CEMENT.
B—BLUE LIAS LIME.
C—RED BRICKS.
D—BLUE BRICKS.
E—TIMBER.
F—STONEWARE PIPES, &c.
G—STONEWARE PIPES, &c. (PATENT JOINTS).
H—IRON CASTINGS, IRON GULLEYS, &c.
I—YORKSHIRE FLAGS, KERB, &c.
J—GRANITE SETTS, KERB AND BROKEN GRANITE.
K—IRONSTONE SLAG, CHIPPINGS, &c.
L—RIVER GRAVEL.
M—COAL.
N—PICKS, SHOVELS, SCOOPS, &c.
O—IRONMONGERY.
P—SCAVENGING AND OTHER BRUSHES.
Q—DISINFECTANTS.
R—REFINED TAR.
S—PITCH.
T—CREOSOTE OIL.
Forms of Tender may be obtained on applying to Mr. Arthur Brown, M.Inst.C.E., City Engineer, Guildhall, Nottingham, on payment of a deposit of 5s each, which will be returned on receipt of a *bond-fide* Tender in accordance with the Specifications, providing such Tender is not withdrawn and is Delivered by the time stated below.
Patterns and Samples may be Inspected at the Eastcroft Depôt, London Road, Nottingham.
The Committee will not consider any Tender except on the authorized Form of Tender, which must be Delivered to the undersigned, in the official envelope provided, on or before Thursday, 25th November, 1920.
The lowest or any Tender will not necessarily be accepted, and Tenders will only be accepted from persons who conform to the Conditions as regards paying the local Standard Rate of Wages, &c., and to the working rules of the Nottingham district applicable to the various trades.
By order,
W. J. BOARD,
Town Clerk.
Guildhall, Nottingham,
Nov. 1, 1920.

SKIPTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Council invite Tenders for the RESETTING of Twelve RETORTS in a Through Arch, at the Council's Gas-Works; also new IRONWORK for the same.
Further Particulars may be obtained from the Manager, Gas-Works, Skipton; and Tenders, endorsed "Retorts," are to be sent to him not later than the first post on Thursday, Nov. 11, 1920.
RICHARD WILSON,
Clerk to the Council.

JOHN HALL & CO. OF STOURBRIDGE
LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods
RETORTS CAREFULLY PACKED FOR SHIPMENT.

TROTTER, HAINES, & CORBETT LIMITED,
BRETTELL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS. Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.
LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

'BUFFALO' INJECTOR
Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.

SEND FOR LIST.
Telegrams "Temperature London." Tel. No. 12,455 Central.
GREEN & BOULDING, — LIMITED, — 28, New Bridge St., LONDON, E.C. 4.